

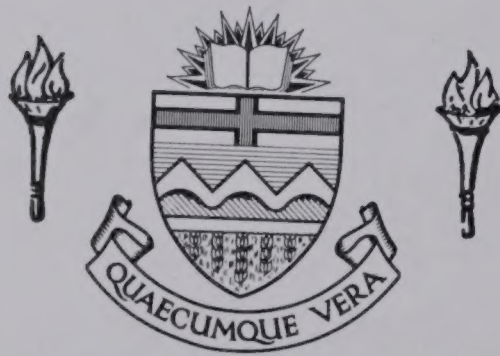
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DYNAMIC RESPONSE OF A BINARY DISTILLATION COLUMN

BY



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A DISSERTATION

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ABSTRACT

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

A binary distillation column of nine inch nominal diameter and having eight bubble cap trays was built and brought into fully controlled operation. The control arrangements studied were control of boil-up by tower differential pressure and control of overhead product composition by varying the reflux flow rate.

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Dynamic Response of a Binary Distillation Column" submitted by William Y. Svrcek, B.Sc., in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

ABSTRACT

A binary distillation column of nine inch nominal diameter and having eight bubble cap trays was built and brought into fully controlled operation. The control arrangements studied were control of boil-up by tower differential pressure and control of overhead product composition by varying the reflux flow rate.

In order to measure the transient response of the binary distillation column a method of continuously measuring the compositions was developed. The method used consisted of circulating the solution off the trays through a capacitance cell and back onto the tray. This composition analysis arrangement did not require sampling which was shown to significantly disturb column operating conditions. For the methanol-water system the capacitance was a linear and strong function of solution composition.

A mathematical model that would describe the transient behavior of a binary distillation column was developed. In the derivation of this model the assumptions were kept to a minimum, so as to make the mathematical model as general as possible. The major assumptions made were perfect mixing of the solution on the trays, and constant volume of liquid hold up.

The equations used to describe the mathematical model were solved on an IBM 7040 digital computer. Comparisons between the experimental transient response data for the trays, bottom product and overhead product, and the corresponding transient response results predicted by the mathematical model were made for eight open-loop and six closed-loop experiments. The step perturbations used in the open loop experiments were feed flow rate, feed composition, reflux flow rate, and steam flow rate, while the step perturbations used in the closed loop experiments were feed flow rate, steam flow rate and composition controller set point.

For the open loop experiments the predicted and experimental transient response had an average deviation of 1% and a maximum deviation of 20% at any point. The transient response data for the closed loop cases showed an average deviation of 2.7% and a maximum deviation of 40% at any point. Since the size of the step perturbations, hence resulting tray composition changes were as large as 30 weight percent, and since the predicted transient response was obtained in approximately 5% of real time, it was felt that the mathematical model developed here was adequate and useful.

Dedicated to my wife

Johann

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I. INTRODUCTION

In recent years a new philosophy of process control has evolved, which has as its ultimate goal the complete automatic processing plant. Before this goal can be accomplished, however, the dynamic behavior of the controlled process must be known so that the control system and process system can be integrated into a single system.

Theoretical analyses are required at the design stage of a controlled process in order to minimize capital investment and to optimize the performance. The theoretical prediction of the dynamic behavior of a controlled process requires that the measuring system, the regulating system, the controllers, and the process be amenable to mathematical definition. At present, the first three can be reasonably defined, but rigorous mathematical descriptions, except for the simplest of processes, have not been developed.

Since distillation is one of the oldest and most used unit operations in the chemical industry, it is expected that rigorous mathematical description of unsteady-state distillation phenomena will constitute an important contribution to the eventual design of completely automatic processing plants. By unsteady-state or transient behavior is meant any process in which one or more of the variables, such as the liquid or vapor compositions at a given point in a distillation column, vary with time. In the steady-state

operations, all of the column variables are independent of time.

The studies^(1,2,3) found in the early literature are concerned exclusively with some aspect of steady-state distillation. The reasons for this are two-fold: first, the design methods for continuous distillation columns are based on the assumption of steady state operation; and second, the unavailability of the equipment required for the study of the unsteady state behavior of distillation columns. Thus, the methods^(4,5) for solving problems in steady-state distillation have been thoroughly investigated and are quite satisfactory, even though empiricism is used extensively. It is obvious that unsteady-state distillation is a more complex problem than steady-state distillation, because of the difficulties introduced by the time dependency of the system variables.

The mathematical models for the transient behavior of the distillation process presented in the literature⁽⁸⁻³¹⁾ include numerous assumptions which allow for easy computation on an analog or digital computer. These assumptions can be summarized as follows and will be referred to as "the usual simplifying assumptions".

- 1) Molal liquid and vapor flow rates are independent of time.
- 2) Molal liquid holdups in the column are constant.
- 3) Vapor holdup is negligible in comparison with the liquid holdup.
- 4) Liquid on the plates, the reboiler, and in the overhead

condenser system (where an overhead holdup is assumed) is perfectly mixed.

- 5) Efficiency of all plates is equal to some constant, usually taken to be 100 percent.
- 6) The column operates adiabatically.
- 7) The liquids composing the binary system have similar thermal properties.
- 8) The column operates at constant pressure.

The most general model presented in the literature is that of Franke et al⁽³⁵⁾ which retains only the assumptions 2, 3, 4, and 6 in the above list. On the other hand, the other models presented⁽⁸⁻³⁷⁾, incorporate all of the usual simplifying assumptions. A more complete description of the literature on column dynamics and control is found in Part II under Literature Review.

The specific objectives of the present work were

- 1) to develop a method of continuously measuring the liquid compositions on the trays, in the overhead product and in the bottom streams for the binary system methanol-water.
- 2) to develop a dynamic model for the binary distillation system which would adequately describe the open-loop transient response of the liquid compositions on the individual trays, in the overhead product, and in the bottoms streams to perturbations in the feed flow rate, steam flow rate, reflux flow rate and feed composition.

- 3) to extend this model to the closed loop case. That is to say, the mathematical relationship describing the overhead composition control loop was included in the model. The perturbations used to generate the closed loop transient response data were steps in feed flow rate, steam flow rate, and composition controller set point.
- 4) to try and verify the mathematical model results, both in the open loop and closed loop, by comparison with experimental results.

The mathematical relations which were formulated for both the open loop and closed loop cases were not restricted by assumptions 1, 2, 5, 6, 7, and 8 listed above. In fact, the only assumptions involved were numbers 3 and 4 together with the additional assumptions of constant volume of solution on the trays, in the reboiler, and in the condenser.

The equations associated with the model were programmed for computation using the IBM 7040 digital computer. The results of this theoretical program were verified by experimental data obtained from an eight tray, nine inch diameter distillation column using the binary system methanol-water.

II. LITERATURE REVIEW

A. Literature Relating to Distillation Column Dynamics

Recently a number of extensive reviews relating to the subject of distillation column dynamics have appeared in the literature. The first review by Archer and Rothfus⁽⁶⁾ relates to the period before 1961. In 1963, Williams⁽⁷⁾ updated the literature review on column dynamics. In his review he not only commented on the papers to that date, but considered in detail the assumptions made during the development of each model.

Basically, the papers presented in the literature fall into two categories; namely, those which presented only a theoretical work⁽⁸⁻²⁶⁾ and those which presented both a theoretical model and a comparison of the predicted and experimental data⁽¹⁷⁻³⁶⁾. It is proposed here to discuss only the salient papers on binary distillation column dynamics.

Rademaker and Rijnsdorp⁽⁸⁾ discussed the work done on column control and dynamics at the research centers of Royal Dutch/Shell Group at Delft and Amsterdam. The authors classified the various column control schemes and indicated their advantages and disadvantages. Although a very complex model was presented, the equations for the model were linearized and then programmed both on the analog and on the digital computer. A comparison between experimental and predicted

results was presented for a tall Turbo grid tray column. The results of the frequency analysis are presented on Bode plots. A visual appraisal of these plots indicated good agreement, but the authors give no actual figures.

Wilkinson and Armstrong⁽²⁷⁾ determined, both experimentally and analytically, the transient response of a five tray enriching column to step changes in the composition of the vapor feed. Since the "usual simplifying assumptions" formed the basis for their mathematical model, they were able to use the conventional Laplace transform approach to solve the resulting set of linear coupled differential equations. The experimental phase of the work was carried out on a five tray, four inch diameter, one bubble cap per tray stripping column operated at total reflux. The interesting part of the experimental work was the use of a microhydrometer to determine the composition changes on one plate at a time during any given run. The procedure used was to pump the solution from the tray through a cooler, through a continuously reading and recording microhydrometer, through a heater and back onto the tray. The authors wrote, "the major advantage of this measuring unit, when carrying out lengthy experiments, is that there is no liquid withdrawal and therefore no change in the column liquid flow rate". The theoretical results and experimental results were compared on plots of fractional approach to equilibrium against non-dimensional time. The authors concluded that the experi-

mental results agree well with the theoretical predictions, but no actual figures were presented. From a visual appraisal of the plots presented in the paper, it must be concluded that the agreement was poor in the area of the inflection point of the response curves.

The works of Rosenbrock^(10,11) comprised a theoretical study in which the author described the various techniques for the integration of a set of coupled linear differential equations. He compared the applicability of the Laplace transform method, the analog computer and the digital computer for solving systems of differential equations. He concluded that the digital computer offered the most efficient means of solving large systems of differential equations of the type which normally arise when handling a problem involving binary distillation column dynamics. In the last part of reference 10, Rosenbrock compared his theoretical predictions to the experimental data of Armstrong and Wilkinson⁽¹²⁾.

Armstrong and Wilkinson⁽¹²⁾ presented the transient response of a four inch, twenty-one tray distillation column using a mixture of benzene and carbon tetrachloride to step changes in feed compositions and step changes in reflux ratio. Again the experimental transient data on the liquid compositions were collected using the micro-hydrometer⁽⁹⁾. As pointed out in the previous paragraph, the experimental results were compared to the theoretical predictions provided by Rosenbrock.

The authors claimed the results to be satisfactory although no actual figures were reported.

Armstrong and Wood⁽²⁸⁾ have developed a simple model using the Laplace transform approach. The equipment used was the same as that used by Armstrong and Wilkinson⁽¹¹⁾, but the experimental procedure used to obtain the transient response data was to sample the solution on the trays. To ensure a uniform sample the authors used a small circulation system on each tray and took a small sample of solution from this circulation system. The authors concluded that there was reasonable agreement between theory and the experimental results, but again no actual figures were given.

The works of Gerster et al consisted of a series of papers starting in 1961⁽²⁹⁾. The first paper described the operation of a five tray stripping column at total reflux, using the system acetone-benzene, and the response of the tray compositions to a step change in feed composition. These results were compared to the computer predictions provided by Lamb and Pigford⁽²⁵⁾. The authors stated, "the average difference between the predicted and experimental tray compositions was 13%, indicating that the relatively simple perturbation equations may be used with confidence to characterize such transient behavior of distillation columns and to assist in development of optimum control schemes for these columns."

The second in this series of papers⁽³⁰⁾ described the effect on tray composition of changes in liquid and vapor rate to the five tray column mentioned above. Again, it was shown that perturbation type equations predict satisfactorily the response of the liquid compositions within a distillation column.

The third paper⁽³¹⁾ studied the transient response of the solution compositions to and from the overhead condensing system and to and from the reboiler. It was felt by the authors that the transient responses of these components of the column should be known before the units were combined to form a complete distillation column. Again these transient response data were compared to the solution of perturbation type equations⁽²⁵⁾. The figures presented in the paper showed that the agreement between predicted and experimental results was very good.

Gerster et al in their final report⁽³²⁾ present the tray composition dynamics of a complete distillation column. This report introduced the added complications of conventional feed tray, and a condenser-reflux drum combination. The column contained ten trays. Again the experimental data were compared to the solution of a set of linearized differential equations that describe the dynamics of a binary distillation column. The conclusion reached in this study was that these differential equations predict the unsteady-state

performance of a ten-tray distillation column with reasonably good precision (less than 15% deviation at any point) provided that the magnitude of the disturbance is not too large (less than 5% perturbation step size).

A more recent paper on column dynamics was by Osborne⁽³³⁾ in which a set of linear differential equations was derived to describe the transient behavior of plate-type columns. The equations gave the time-rate of change of the composition of one component in one section of the column. Test results indicated a satisfactory prediction of the change in composition from one steady-state condition to another for binary as well as multicomponent systems, but no actual figures were presented. The model was more accurate when used to predict results of small upsets in column conditions, since under these conditions the assumption of constant holdup was justified.

Of particular interest to this work were the papers by Huckaba, May, and Franke⁽³⁴⁾ and Huckaba, Franke et al⁽³⁵⁾. In the first paper⁽³⁴⁾ the authors developed a model which, as mentioned in the introduction did not contain all the "usual simplifying assumptions". The major assumptions involved in the development of their model, as stated by the authors, were:

- 1) "Liquid composition in each stage is uniform"
- 2) "Holdup in each stage is constant"

- 3) "The holdup of vapor in the column is small compared with that of the liquid"
- 4) "The column operates adiabatically."
- 5) "Both liquid and vapor entrainment are negligible."
- 6) "Plate efficiencies are independent of time."

The paper outlined, in detail, the development of the equations for the model. The procedure used on each tray was to write, for the more volatile component, the mass, component and heat balances. The condenser and reboiler were considered as special cases of a tray. The equations presented by the authors for a tray were as follows:

- 1) The equation for tray mass balance was

$$(L_{n+1} + V_{n-1}) - (L_n + V_n) = 0$$

- 2) The equation for tray component balance was

$$(L_{n+1}X_{n+1} + V_{n-1}Y_{n-1}) - (L_nX_n + V_nY_n) + S_nX_n = W_n \frac{dx_n}{dt}$$

- 3) The equation for tray heat balance was

$$(L_{n+1}h_{n+1} + V_{n-1}H_{n-1}) - (L_nh_n + V_nH_n) + Q_n = W_n \frac{dx_n}{dt}$$

With the addition of equations for the thermodynamic properties of the system and the equations for the Murphree Liquid efficiencies their model was complete. The model equations were programmed for the IBM 650 digital computer. The paper further presented the details of the calculation procedure used to solve their model. The integration routine used was the fifth-order Modified Adams procedure with the

starting values computed by the Runge-Kutta-Gill procedure.

As a check on their model they undertook an experimental program utilizing a twelve-plate distillation column for a methanol-tertiary butyl alcohol system. Since the densities of the two components were comparable, the assumption of a constant holdup was probably reasonable. Their experimental program consisted of studying the transient response of the solution composition on the trays to a change in reflux ratio. The transient response was determined by frequent sampling of the solution on alternate trays. The agreement between the results predicted by their model and those obtained experimentally by them, as pointed out in the paper, was best at the ends (condenser and reboiler) of the column and poorest on the middle trays. The explanation offered in the paper by the authors was "That the agreement at these locations is better than at locations nearer the center of the column is not surprising because of the relatively large hold-up in both the reboiler and the condenser. The middle plates of a column are consequently the most sensitive of any in the column, both from the standpoint of experimental changes in an actual column and from mathematical errors in the numerical solution." The deviation at any point between calculated and experimental results did not differ by more than 4%.

In the second paper⁽³⁵⁾, the effect on the column dynamics of perturbations in heat input to reboiler, step

changes in feed composition, and a simultaneous step change in feed composition and reflux ratio are presented. Again, it was shown by the authors that predicted and experimental results at any point differed by less than 5%. In the summary of this paper it was pointed out that the assumption of perfect mixing on the trays probably becomes restrictive for larger columns, hence, the assumption of constant holdup is not applicable for the general case.

It can be seen, from the above literature review, that the mathematical models presented in the early literature contained many assumptions, were linear in nature, and considered only the set of differential equations arising from writing a component and material balance on each tray. With the general use of computing machines (analog and digital) more sophisticated models were considered. Furthermore, the general equations describing the dynamics of a plate type distillation column have been presented many times in the literature, hence, it remains only to develop methods of solving the most general system of non-linear coupled differential equations or solving a set of equations resulting when a number of simplifying assumptions are made.

From the experimental point of view the trend has been to larger size units with means for continuous data logging. As yet, very little consideration has been given to the method used for sampling the solution on the trays and the

effect that the sampling has on the transient response of the column.

B. Literature Relating to Distillation Column Control

The control of distillation columns is one of the most interesting and challenging branches of process control. Hundreds of papers have been written on the subject and the number of proposed schemes probably runs into the thousands. Hence, this work will review only some of the more significant recent papers.

In general, one can say that the control schemes presented in the literature, for the most part, have used temperature measurement on an intermediate plate or plates as a means of controlling the compositions of the product flows. With the advent of composition measuring equipment there has been a switch to directly monitoring the compositions of interest (usually the overhead product composition), and to maintaining a constant overhead composition by manipulating the reflux flow rate, the boil up rate, or both.

Moreover, the studies presented in the literature are all experimental or all theoretical. Very few papers have been published in which the experimental and simulated results are compared.

Williams et al^(14,15,16,17), in a purely theoretical study, discussed, in great detail, the problem of column

control. In the first paper⁽¹⁴⁾ they described the problem involved in choosing a controller for a five-tray column and the analog computer solution of the problem under conditions of variable feed composition and quality. In particular, the paper derived a mathematical model for a five-tray column, condenser, reboiler and associate controller. The effect on the controller settings of feed composition changes, number of composition samplers, and location of composition samplers was determined. The range of controller settings for non-cycling control for various sampler locations and number of samplers used was presented in graphical form. The authors also reached a number of conclusions regarding the combination of controller modes (proportional, integral and derivative) that should be used with each type of composition sampler and composition sampler location. As an example, they concluded, "A combination of proportional and integral control was effective for intermediate plate and top plate single-point sampling or top plate and bottom plate two-point sampling."

In the next paper Williams et al⁽¹⁵⁾ discussed the problem of column product and bottoms composition control when the upset to the column was a varying feed flow rate. It was shown that the problem can be handled in the same manner as in the previous paper⁽¹⁴⁾ provided that an additional separate controller is used to maintain the boilup rate as a definite multiple of the feed input rate. This paper also

discussed the problem of an imperfect sampler (one incapable of detecting small variations of the sample variable) and its effect on the controller settings. The effect was to cause cycling to occur at a larger proportional gain.

In the next article⁽¹⁶⁾ Williams et al dealt with the particular problems which arise when using instruments such as mass spectrometers, infrared and ultraviolet spectrometers in a control scheme. The problem with such instruments was that their outputs are discontinuous. Hence, the nature of these instruments resulted in the column and controller being considered as a sample data system. Again the results were presented as plots of integral constant versus proportional constant. This compact method of plotting clearly showed the effect of sampling delay and sampling rate upon the column control dynamics. Specifically, the figures showed the range of controller constants for which non-cyclic control can be obtained.

The final paper⁽¹⁶⁾ in this series summarized the previous works. A number of control schemes, factors to be considered, and a recommendation for an effective control scheme for a distillation column were presented. No attempt was made to compare simulated results with experimental results.

Jafri and Wood⁽³⁷⁾ used a ten-plate, six inch diameter column involving bubble plates in a theoretical and

experimental study. The authors developed control schemes for "one manipulated variable control (reflux rate)" and "two manipulated variable control (reflux and reboil rate)" which they then tested on an experimental column. In the conclusion they presented the "optimum" control parameters determined as a result of the study. In this particular study the temperatures on plates seven and two were used as the composition indicators.

Luyben and Gerster⁽³⁸⁾ discussed the feasibility of using feed forward control on a binary distillation column. They also simulated the linearized equations on an analog computer for a ten tray and forty tray column. The performance of the feed forward control scheme was tested experimentally on a ten tray, two foot diameter column. Since the overhead and bottoms product compositions did not change by more than 1 mole percent when the feed composition was changed by 10 mole percent, the authors concluded that relatively simple feed-forward controllers are adequate.

Distefano et al⁽³⁹⁾ discussed the dynamics and feed forward control of a column subject to a sequence of upsets. The column was first simulated on a digital computer and the reflux ratio was used to control the overhead column composition. The computer was not actually used to adjust the experimental column, but rather the reflux-ratio controller was adjusted manually according to the values predicted by the

simulation. The agreement between experimental and simulated results was within 12% at any point.

In a purely theoretical study, Wagner⁽⁴⁰⁾ discussed the simulation of the dynamics of a binary distillation column and accompanying control scheme on an analog computer. The simulation of the column dynamics consisted of writing the approximate transfer functions for the various parts of the column and control system. The transfer functions were then programmed on an analog computer and the optimum controller settings for the column pressure and column steam flow rate were determined. The magnitude of the effect of measurement errors such as temperature and pressure on the overhead product composition were also ascertained. Wagner made the point that the temperature sensing element must be located on the tray where the composition temperature relationship is most sensitive. If this was the case, then the worst possible combination of measurement errors resulted in a 0.22% change in overhead concentration which was within the permissible fluctuation of 0.3% specified by the authors.

A discussion of column control and dynamics is presented in Part Five of "Techniques of Process Control"⁽⁴¹⁾. The author summarized some of the usual column control arrangements and outlined their advantages and disadvantages.

III. THEORETICAL MODEL DEVELOPMENT

The continuous distillation of a liquid mixture in a stagewise contact column involves three transport processes: heat transfer; mass transfer; and fluid flow. To obtain a completely rigorous mathematical model for the continuous distillation process it would, therefore, be necessary to formulate a model which would include the mechanics and interrelationships of these three transport processes.

To describe the mechanics of the fluid flow occurring within the system, detailed descriptions of the column internals, the pipe sizes and arrangement, the condenser and accumulator system, and the reboiler would be required. From these descriptions, the amounts and locations of the liquid and vapor holdup present could be determined. The next step would be to set up the equations describing the effect of the vapor and boiling liquid flow streams on the mixing in the holdup regions.

Since mass transfer takes place in the liquid hold-up on a plate in the column, the composition is readily seen to be a function of time and position within the liquid phase on the plate. The mass transfer rate at a given location is a function of the difference in the composition of the vapor and liquid in contact, as well as the composition gradient within the liquid phase. Furthermore, since the heat transfer coefficients are a function of composition as well as liquid

and vapor velocities, it is apparent that the mathematical model obtained in a completely rigorous analysis would be quite formidable. In addition, the partial differential equations, which would be obtained, would undoubtedly be very cumbersome to manipulate in attempting to effect solutions of specific problems of interest in distillation operations.

Thus, as in essentially every analysis involving the formulation of a mathematical model for a particular process, a decision must be made as to exactly what is to be required of the model. The purpose of the mathematical model in this investigation was to facilitate the prediction of the transient behavior of a stagewise continuous distillation column, both in open loop and in closed loop operation, to a variety of perturbations.

The particular binary distillation column was nine inches in diameter, contained eight bubble cap trays, a total condenser, and a basket type reboiler. The column was used to separate the methanol-water system from a fifty weight percent feed to a ninety-eight percent product and a two weight percent bottoms product. The details of the experimental equipment and experimental results are discussed in later sections.

A. Steady-State Equations

As a first step in the development of a mathematical model to describe the transient behavior of the binary distillation process a knowledge of the steady-state behavior is essential. The basic equations governing the heat and mass transfer for a binary distillation column have been presented in the literature^(4,5).

The following tray model will be considered. Tray n is a perfectly mixed cell with the inputs and outputs as shown in Figure 1.

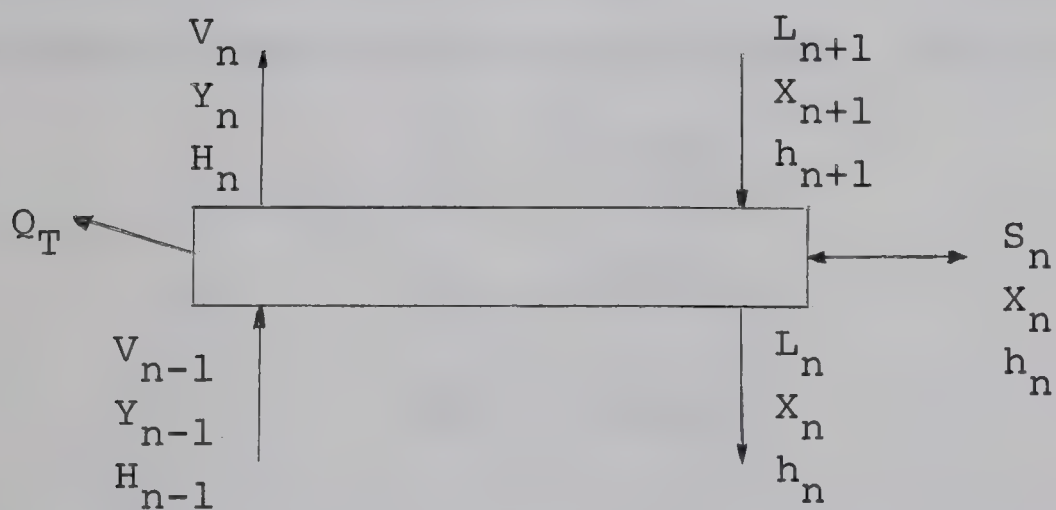


Figure 1
Tray Model for Steady State

At steady state the following mass, component and heat balances can be written.

1) The overall mass balance on tray n is:

$$L_{n+1} + V_{n-1} + S_n = V_n + L_n \quad (1)$$

2) The component mass balance on tray n is:

$$L_{n+1}X_{n+1} + V_{n-1}Y_{n-1} + S_nX_n = V_nY_n + L_nX_n \quad (2)$$

3) The heat balance on tray n is:

$$L_{n+1}h_{n+1} + V_{n-1}H_{n-1} + S_nh_n = V_nH_n + L_nh_n + Q_T \quad (3)$$

For a binary distillation column equations (1), (2) and (3) can be written for each tray. The following auxiliary equations which describe the thermodynamic relationships of the particular system are also available. That is

$$H_n = H(Y_n) \quad (4)$$

$$h_n = h(X_n) \quad (5)$$

$$XE_n = X(Y_n) \quad (6)$$

where $H()$, $h()$ and $X()$ denote a functional relationship of H_n , h_n and XE_n on Y_n , X_n and Y_n , respectively.

Since in a real distillation column the mass transfer occurring on a tray is not complete, the effect of incomplete mass transfer on a tray may be characterized by a factor called the Murphree Liquid Efficiency. Hence, the following

equation is added to the equations describing the steady state behavior of a tray,

$$EM_n = f(L_n, V_n, X_n, Y_n, \text{Geo}) \quad (7)$$

where f denotes a functional relationship among the independent variables L_n , V_n , X_n , Y_n , and Geo .

Considering the binary distillation column from an overall point of view, Figure 2, the following equations can be written:

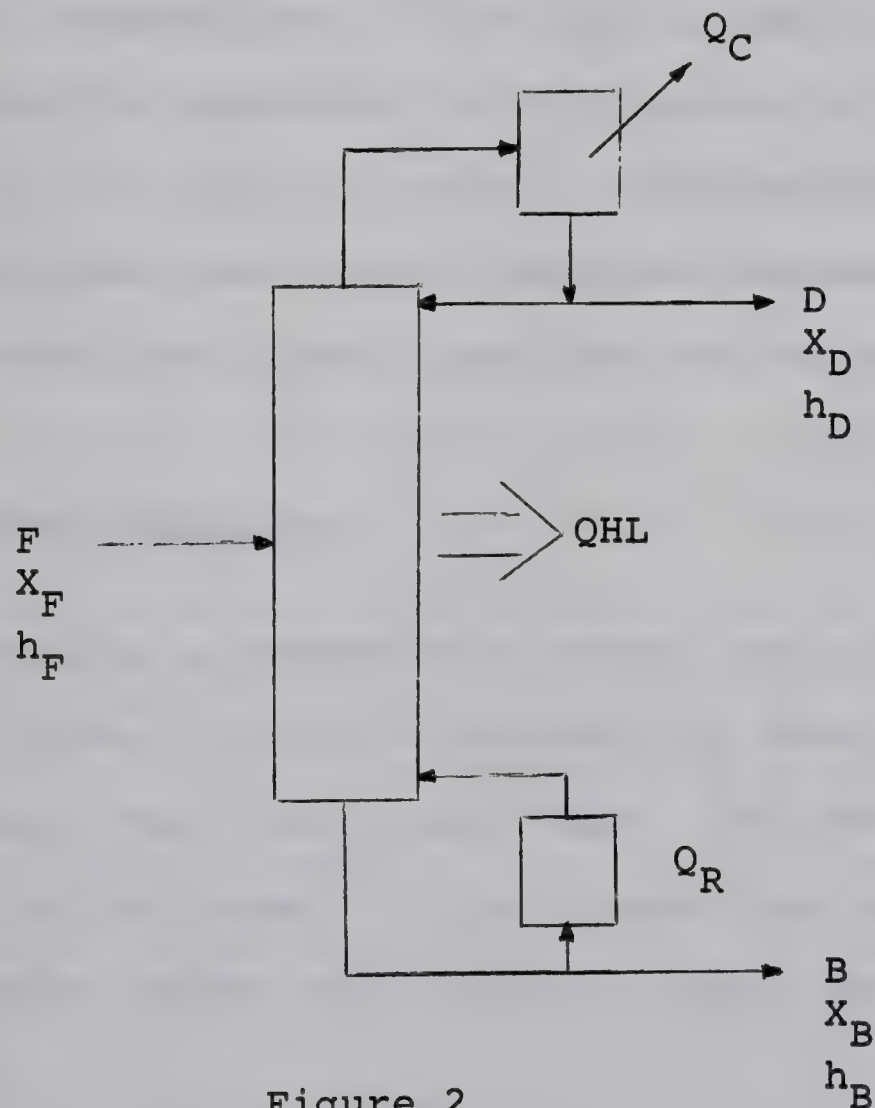


Figure 2
Overall Column Schematic

1) The overall mass balance is:

$$F = D + B \quad (8)$$

2) The overall component mass balance is:

$$FX_F = D X_D + B X_B \quad (9)$$

3) The overall heat balance is

$$Q_R + F h_F = D h_D + B h_B + Q_C + Q_{HL} \quad (10)$$

A detailed analysis⁽⁴⁾ shows that to be able to solve the system of equations (1) through (10) at least four variables must be specified. If F , X_F , R , and X_D are given then by an iterative procedure it is possible to determine D , B , X_B , Q_R , Q_C , X_n , Y_n , L_n , and V_n . Similarly if Q_R , F , X_F , and X_B are given then by an iterative procedure the composition, vapor, and liquid profiles can be calculated.

B. Dynamic Model Equations

In writing a mathematical model for a process the dilemma which arises is that of determining exactly what detail is necessary for a particular task. For the general case, as pointed out by Williams⁽⁷⁾, the mathematical model for a plate distillation column would contain equations to describe the following:

- 1) A component material balance for each component less one, for each well-mixed region on each tray;

- 2) An enthalpy balance equation for each well-mixed region on each tray;
- 3) An equation relating the liquid dynamics in each well-mixed region on each tray;
- 4) An equation relating the vapor dynamics in each well-mixed region on a tray;
- 5) An equation relating the flow and pressure dynamics of the vapor between trays;
- 6) An enthalpy-balance for the region between the trays;
- 7) An equation relating the fluid dynamics of the liquid flowing between trays; and
- 8) An equation for each well-mixed region on each tray relating the rate of attainment of equilibrium between liquid and vapor in that region.

The solution of the complex set of equations arising from this very complete mathematical model of the transient response of a plate distillation column would be a formidable task. The approach used in this study, and as used by other workers, is to make a number of simplifying assumptions. The assumptions made are generally of two kinds: those made because a phenomenon cannot be measured accurately, and those based on physical considerations such as size and internal arrangement of the equipment being simulated.

The specific assumptions made which fall into the category of phenomena which are difficult to measure and hence

to correlate accurately are:

- 1) Equilibrium between liquid and vapor is instantaneously realized. This eliminates, from the general set of equations, the equations resulting from item 8.
- 2) No holdup in the vapor on the trays. Again, from the general set of equations, this assumption would eliminate the equations resulting from items 4 and 6.

Those assumptions which are based on the size and operation of the equipment are as follows:

- 1) There is no holdup of vapor between the trays. This assumption eliminates the equation resulting from item 5.
- 2) No holdup of liquid in the downcomers between the trays. This eliminates the equation arising from item 7.
- 3) Each tray is considered to be one perfectly mixed cell.
- 4) Volume of liquid on the tray is constant.
- 5) The column operates at a constant pressure.
- 6) There is no liquid entrainment in the vapor.

Having made the above assumptions only the equations required by items 1, 2 and 3 of the general set of equations need be considered. That is, a differential equation each to describe the component, heat and mass balance for each tray of the column. Furthermore, the assumptions result in the column being considered as a series of perfectly mixed cells, Figure 3, undergoing an exchange of mass and heat.

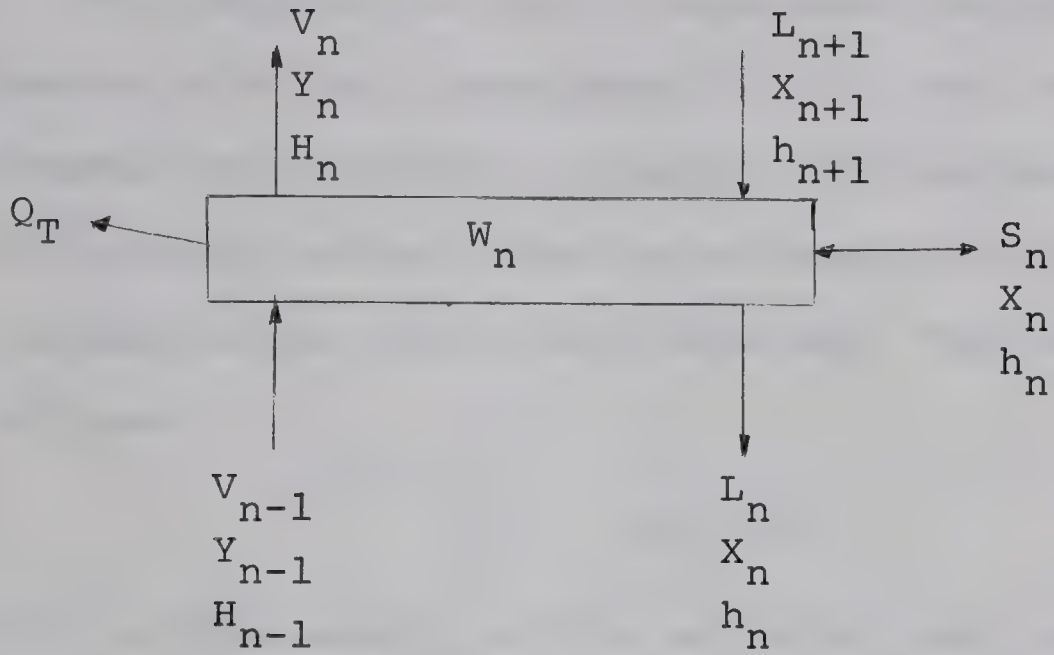


Figure 3

Tray Model for Unsteady State

Considering the tray model of Figure 3, the following differential equations describing the mass, component and heat balances can be written:

1) The overall material balance is

$$\frac{dW_n}{dt} = V_{n-1} + L_{n+1} - V_n - L_n + S_n \quad (11)$$

2) The component material balance is

$$\begin{aligned} \frac{dW_n X_n}{dt} = & V_{n-1} Y_{n-1} + L_{n+1} X_{n+1} - V_n Y_n - L_n X_n \\ & + S_n X_n \end{aligned} \quad (12)$$

3) The heat balance is

$$\frac{dW_n h_n}{dt} = V_{n-1} H_{n-1} + L_{n+1} h_{n+1} - V_n H_n - L_n h_n - Q_T \quad (13)$$

To complete the set of equations required to describe the dynamics of a tray, equations (4), (5) and (6) for the thermodynamic relationships, equation (7) for the Murphree Liquid Efficiency and an equation to calculate the liquid weight holdup on the tray n are required. The holdup equation is as follows:

$$W_n = W(X) \cdot VP \quad (14)$$

where $W(X)$ is the density of the solution and, for a binary solution at its boiling point, is only a function of the solution composition.

In order to complete the mathematical model for a binary distillation column, equations for the transient behavior of the total condenser and reboiler are required.

The model of a total condenser, Figure 4, is that presented by Campbell⁽⁴²⁾. The total condenser is considered as a perfectly mixed cell with a vapor input, V , which is immediately condensed and two liquid outputs, one to the reflux and the other to product storage.

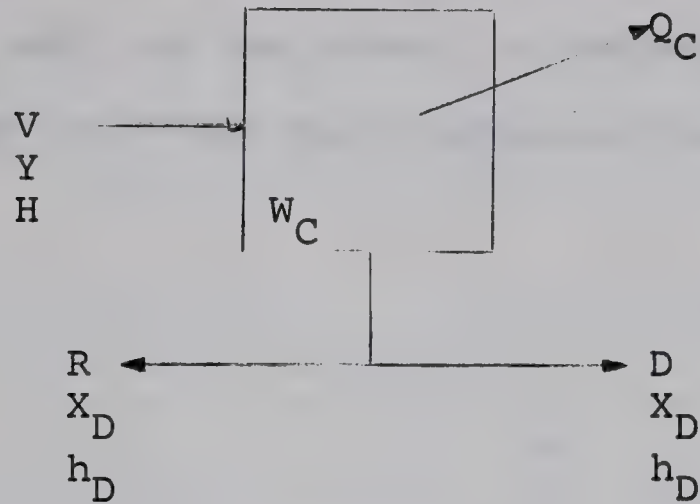


Figure 4
Condenser Schematic

The mathematical equations used to describe a total condenser need consider only the mass and component balance. The mass balance is

$$\frac{dw_C}{dt} = V - R - D \quad (15)$$

and the component balance is

$$\frac{dw_C x_D}{dt} = V \cdot Y - x_D (R + D) \quad (16)$$

By expanding the left hand side of equation (16) and substituting for dw_C/dt from equation (15), equation (16) reduces to

$$w_C \frac{dx_D}{dt} = V(Y - x_D) \quad (17)$$

The reboiler, Figure 5, is considered as two perfectly mixed cells, (A) and (B), separated by a heat transfer surface. In cell (A) the steam is condensed and the heat is transferred to cell (B) which contains the reboiler solution.

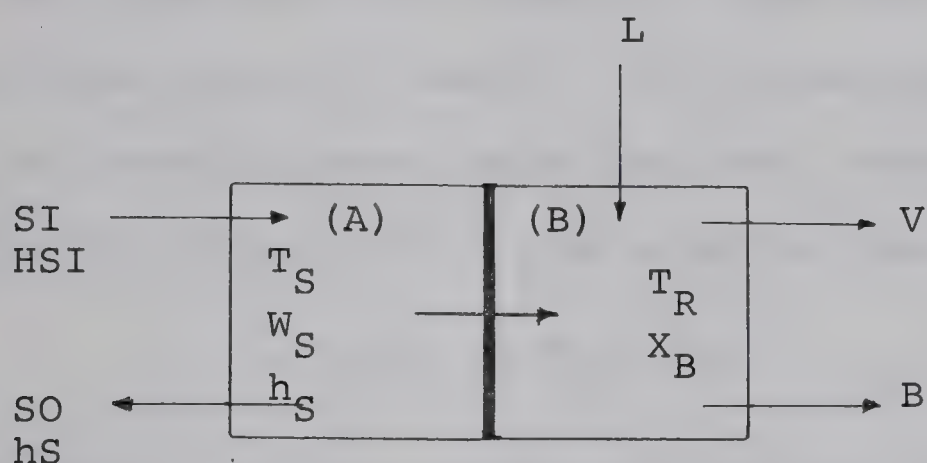


Figure 5
Reboiler Model

It is further assumed that on the steam side, the steam and steam condensate are both saturated.

For the steam side the equation for the mass balance is

$$\frac{dW_S}{dt} = SI - SO \quad (18)$$

and the equation for the heat balance is

$$\frac{dW_S h_S}{dt} = SI \cdot HSI - SO \cdot h_S - Q_R \quad (19)$$

By expanding the left hand side of equation (19) and substituting from equation (18) for dW_S/dt the following equation results:

$$W_S \frac{dh_S}{dt} = SI(HSI - h_S) - Q_R \quad (20)$$

The equations for the solution side of the reboiler, Cell (B), are identical to those of a tray with only one input, L, and two outputs V and B. In the description of the reboiler, an equation describing the heat transfer from Cell (A) to Cell (B) is required. The equation used is

$$Q_R = UA(T_S - T_R) \quad (21)$$

The temperature T_S of the steam side and the temperature T_R of solution side of the reboiler appear in equation (21). For a binary solution at constant pressure the temperature at which the solution boils is only a function of the composition, hence

$$T_R = T(XB) \quad (22)$$

At constant pressure the enthalpy of the saturated steam condensate on the steam side of the reboiler can be assumed to be a linear function of the steam chest temperature T_S , hence

$$h_S = A + B \cdot T_S \quad (23)$$

Equations (20) to (23) describe the heat transfer dynamics of the reboiler. If equation (21) and (23) are substituted into equation (20) the following differential equation

for the steam chest temperature results:

$$W_S \cdot B \cdot \frac{dT_S}{dt} = SI(HSI - A - B \cdot T_S) - UA(T_S - T_R) \quad (24)$$

By rearranging equation (24), and noting that $UA \gg B \cdot SI$, equation (24) reduces to the following equation:

$$\frac{W_S B}{UA} \frac{dT_S}{dt} + T_S = \left[\frac{SI \cdot HSI - A \cdot SI}{UA} \right] - T_R \quad (25)$$

If T_R is a constant then equation (25) is first order with a time constant equal to $W_S B / UA$. It may be shown that the time constant of equation (25) is approximately one thousand times smaller than the time constant, W_R / L , of the composition response of the solution in the reboiler. Thus, the heat transfer dynamics of the reboiler will not be significant when compared to the composition dynamics of the reboiler and therefore the reboiler heat transfer model need consider only the steady state form of equation (24). In expanded form the following equation results for the reboiler steam chest temperature.

$$T_S = \frac{(SI \cdot A - SI \cdot HSI - UA \cdot T_R)}{(SI \cdot B - UA)} \quad (26)$$

The mathematical model of an eight tray column, reboiler, and condenser includes equations (11) through (18) for each tray and the reboiler, equation (21) for the condenser and (26) for the heat transfer dynamics of the reboiler. To facilitate the solution of the model, the equations listed above may be rewritten as a set of linear coupled differential equations for the tray, reboiler and condenser composition dynamics, and a set of linear algebraic equations for the vapor and liquid flow rates within the column. The details of the manipulation and resulting equations are given in Appendix I.

C. Overhead Composition Control Loop Mathematical Model

The following block diagram, Figure 6, can be used to show the various components which must be considered when describing, mathematically, the overhead product composition control loop for the binary distillation column.

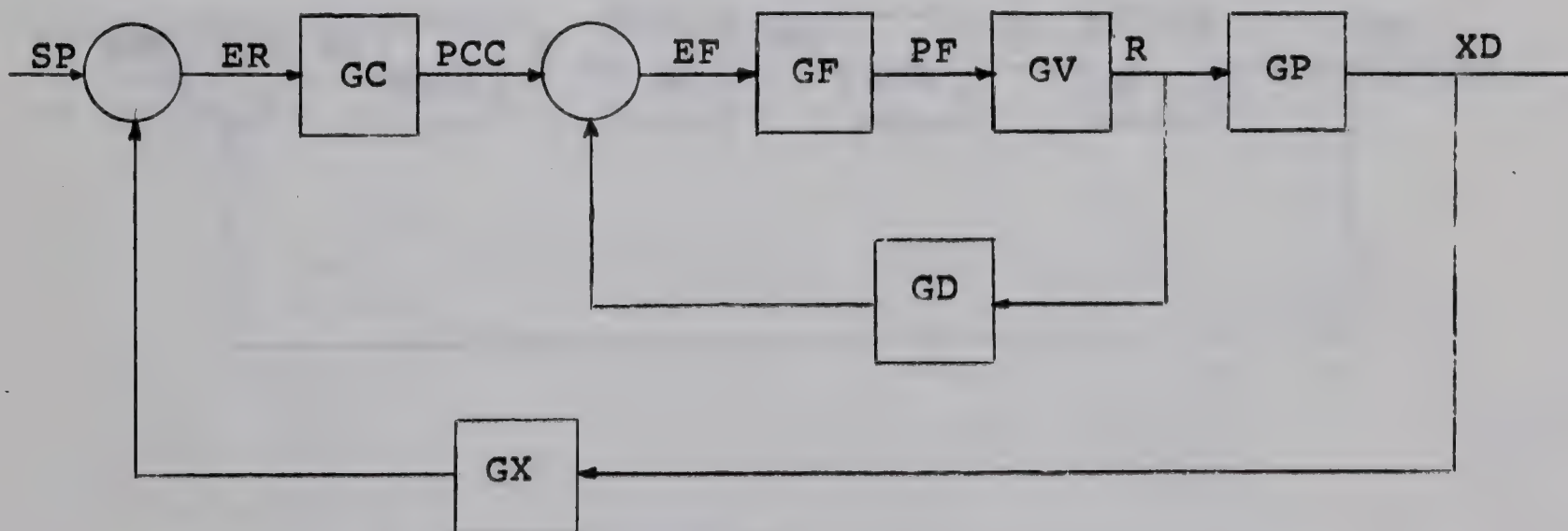


Figure 6

Block diagram of overhead product composition control loop

From the experimental work, it was noted that the reflux flow controller (GF) was always at its set point ($E_F = 0$). Thus, the lag which this controller contributed was negligible and it was considered as a simple converter of unity gain.

For both the reflux flow controller and the overhead composition controller the relation between the controller chart percent and output pressure is 0 to 100% chart for 3 to 15 psig signal. Since this is a linear relationship, the controller equation (GC) can be considered in chart percent and the calibration curves for the composition of the liquid in condenser and flow rate of reflux versus controller chart percent can be utilized. In view of the above considerations Figure 6 can be simplified to the block diagram shown in Figure 7.

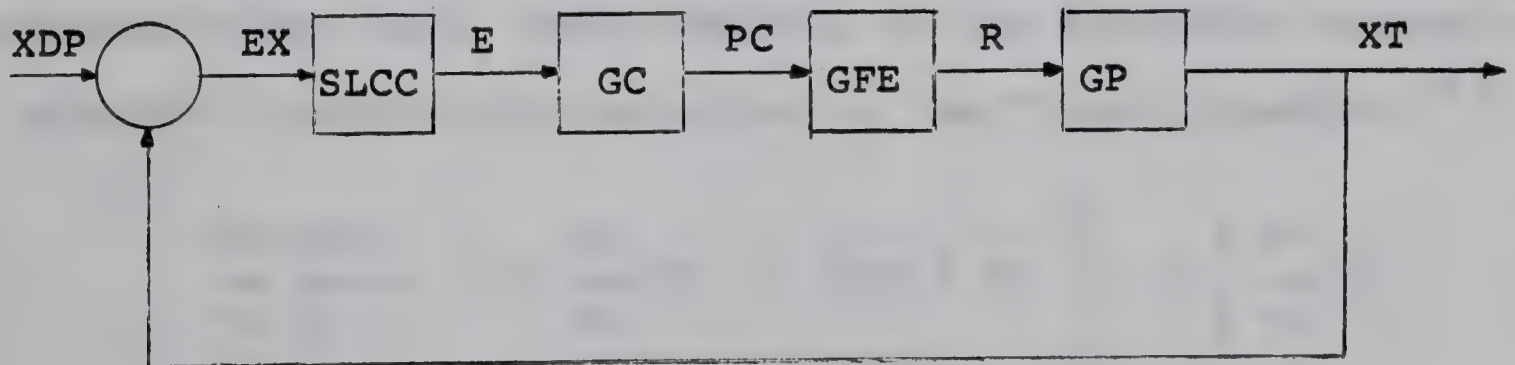


Figure 7

Simplified Overhead Composition Control Loop

By moving around the feed back control loop shown in Figure 7, the following set of equations can be derived. Starting at the summing point and multiplying by the conversion factor obtained from the experimentally determined composition of the overhead product versus chart percent calibration curve, the error signal to the composition controller in chart percent is

$$E = SLCC \cdot (XDP - XT) \quad (27)$$

The next block on Figure 7 is the overhead composition controller equation (GC). This controller comprises a Foxboro Model 9800 dynalog which in turn employs a Foxboro Model "40" Hyper-Reset control element. This particular pneumatic controller has a small bellows fitted in the "feed back" bellows. The purpose of this bellows is to give added stability to the controller in the presence of a short period disturbance, by reducing the overall gain. This explains the appearance of the term, $T_d/T_i \cdot dPC/dt$, in the following controller equation, referred to hereafter as the "Young Equation" ⁽⁴³⁾.

$$\frac{T_d}{T_i} \frac{dPC}{dt} + \left(1 + \frac{T_d}{T_i}\right) PC = PCS + KP \left[\left(1 + \frac{5 T_d}{2 T_i}\right) E + \frac{1}{T_i} \int E dt + T_d \frac{dE}{dt} \right] \quad (28)$$

A rather detailed analysis of pneumatic controllers can be found in references 43 and 44.

Another equation to describe the Foxboro Model "40" with Hyper-Reset controller was acquired through private communication with the Foxboro Company. The controller equation which was developed by Foxboro from a frequency analysis of the controller is as follows:

$$0.2T_d \frac{dPC}{dt} + (1. + 0.0008 \frac{T_d}{T_i}) PC + \frac{0.04}{T_i} \int PC dt$$

$$= PCS + KP \left[(1 + \frac{T_d}{T_i}) E + \frac{1}{T_i} \int E dt + T_d \frac{dE}{dt} \right] \quad (29)$$

and will be referred to hereafter as the "Foxboro Equation".

By differentiation with respect to time of equation (27), equation (30) results

$$\frac{dE}{dt} = -SLCC \cdot \frac{dXT}{dt} \quad (30)$$

Upon substitution of equation (30) into equation (28) and (29), the modified controller equations (31) and (32) result:

$$\frac{T_d}{T_i} \frac{dPC}{dt} + (1 + \frac{T_d}{T_i}) PC = PCS + KP \left[(1 + \frac{5 T_d}{2 T_i}) E + \frac{1}{T_i} \int E dt - T_d \cdot SLCC \cdot \frac{dXT}{dt} \right] \quad (31)$$

$$0.2T_d \frac{dPC}{dt} + (1. + 0.0008 \frac{T_d}{T_i}) PC + \frac{0.04}{T_i} \int PC dt$$

$$= PCS + KP \left[(1. + \frac{T_d}{T_i}) E + \frac{1}{T_i} \int E dt - T_d \cdot SLCC \cdot \frac{dXT}{dt} \right] \quad (32)$$

It remains only to convert the above controller signals in percent chart to a weight flow rate, which can then be used directly in the mathematical model for the remainder of the column. The reflux flow calibration curve which was determined experimentally and plotted as a straight line on log-log paper was fitted with an equation of the form:

$$R = \sqrt{SPG} \cdot ARD(PC^{BRD}) \quad (33)$$

The three equations, (27), (33), and (31) or (32), plus the equations for the mathematical model for the binary distillation system were combined and used to describe the transient response of the liquid phase compositions within the column to steps in feed flow rate, steam flow rate, and composition controller set point.

IV. EXPERIMENTAL EQUIPMENT

In order to verify the mathematical model, an experimental study was conducted on an eight tray, nine inch diameter glass distillation column with a total condenser and a basket type reboiler. The trays were of the bubble cap type with four 1-7/8 inch bubble caps per tray. The column was highly automated with all variables being either controlled or monitored. Figures 8, 9, 10, 11, and 12 are the photographs of the binary distillation column. Since the column extended through four floors it was necessarily photographed in sections. Figure 8 is the section of the column consisting of the top of the reboiler, bottom of the column, and the first five trays. Figure 9 shows tray six to eight, the condenser, overhead pump, condenser cooling water and reflux flow control valves. Figure 10 shows the bottom of the column, and bottom of the reboiler. Figures 11 and 12 are the photographs of the control panels.

A. Details of Column Components

Throughout this subsection reference will be made to the column which was present in the laboratory when this project was initiated. This column was not entirely adequate for purposes of transient response analysis. A number of significant shortcomings included:

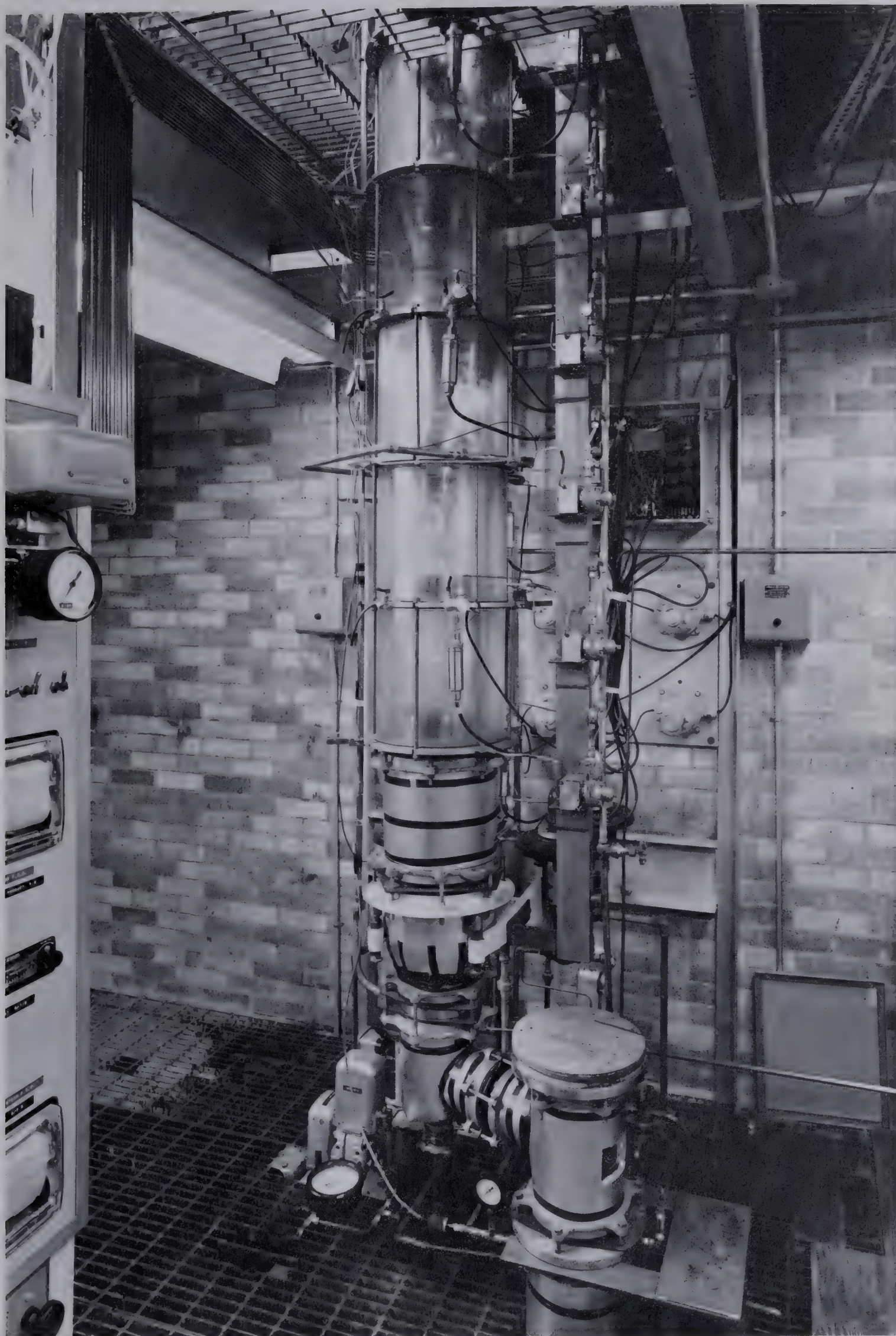


Figure 8 Middle Section of the Distillation Column

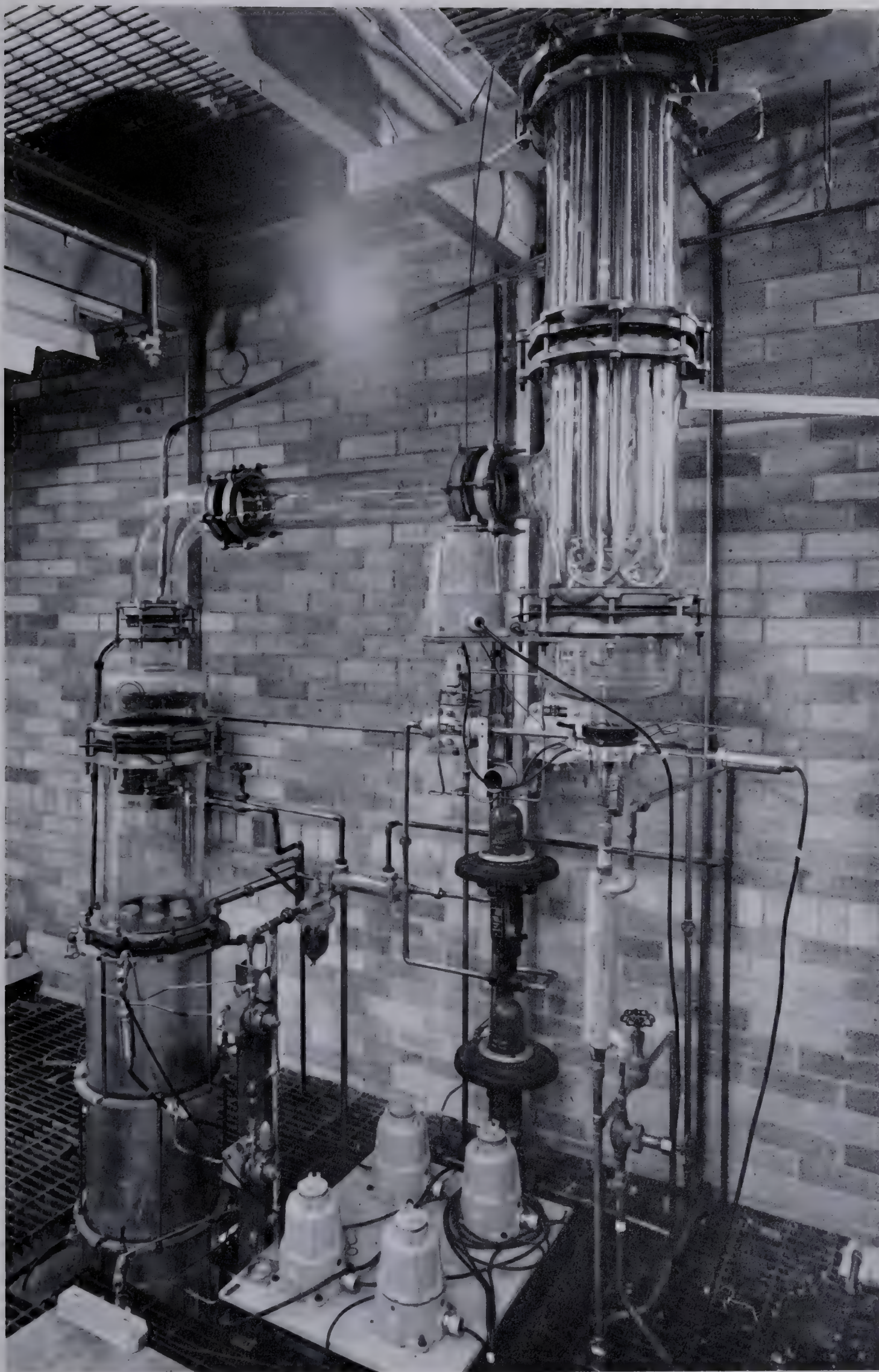


Figure 9 Column Top Section and Condenser Reflux System

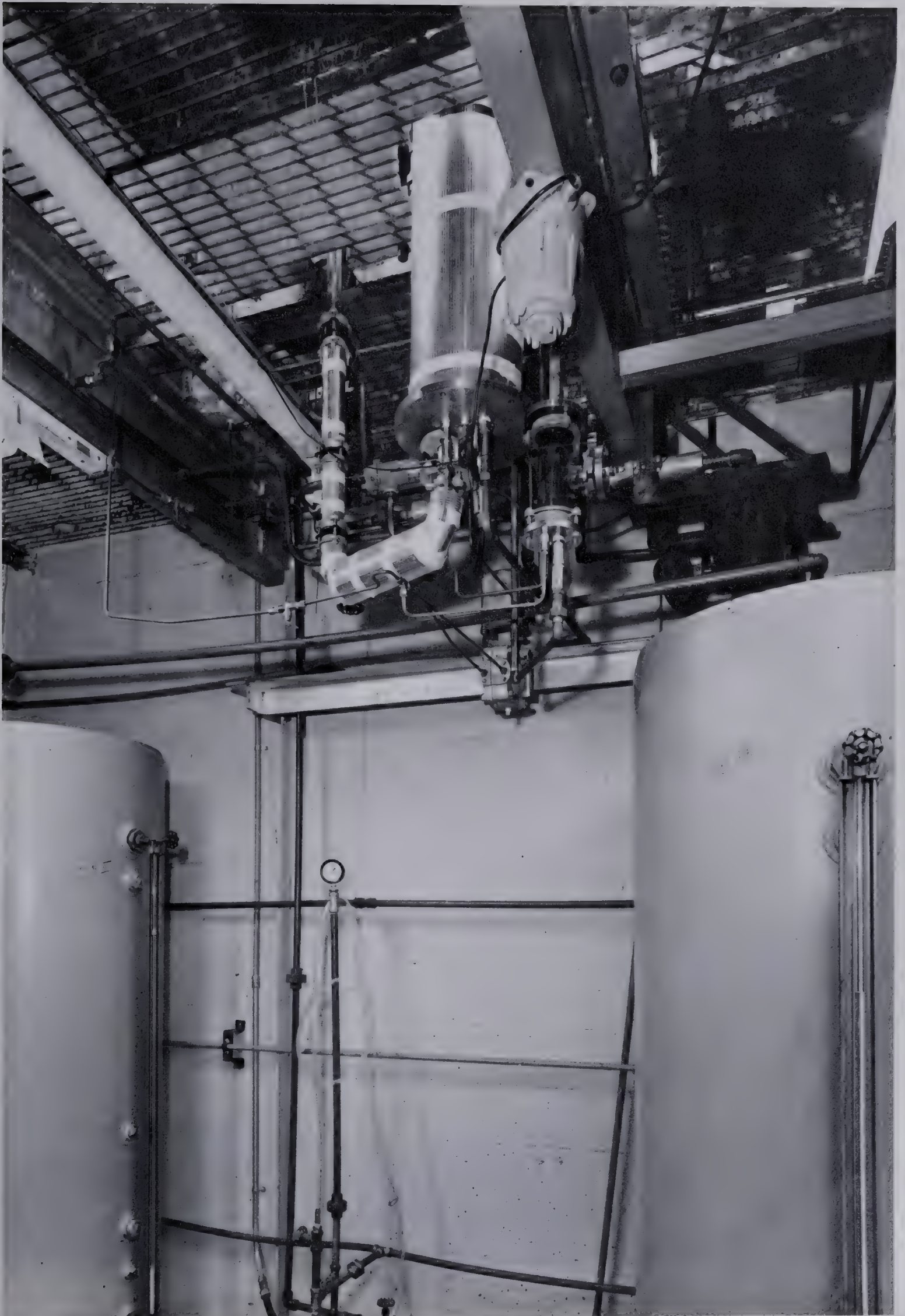


Figure 10 Bottom Section of Column and Reboiler



Figure 11 Primary Control Panel

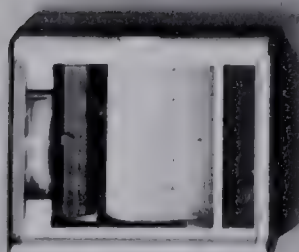
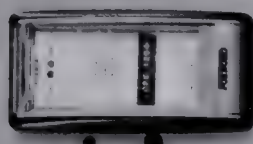


Figure 12 Secondary Control Panel

- 1) Contamination of the solution on the trays and the formation of a brown scale on the glass surfaces, possibly due to the decomposition of methanol or minor impurities on the brass plates which were present in this column.
- 2) The large hold up (1.0 ft^3) of the original reboiler.
- 3) Feed and reflux did not enter the column as saturated liquids but rather as subcooled liquids.
- 4) Lack of solution sampling means and temperature measuring means on the trays, product and bottoms streams.
- 5) The very small amount of feed which allowed for about six hours running time.

The modifications which were made to overcome these shortcomings will be discussed during the presentation of the details of each column component. Specifically, the modifications consisted of fabricating the trays, reboiler and condenser from Type 316 stainless steel. This had the desired effect of preventing the formation of the brown scale on the glass components of the column.

Figure 13 shows the layout of the glass components of the present column. The original horizontal high capacity reboiler was replaced by a compact vertical reboiler arranged as illustrated on the figure. Figure 14 shows the details of the reboiler. It is a basket type reboiler consisting of a seven inch nominal diameter with thirty-eight, one-half inch diameter by twenty-four inch long heating tubes.

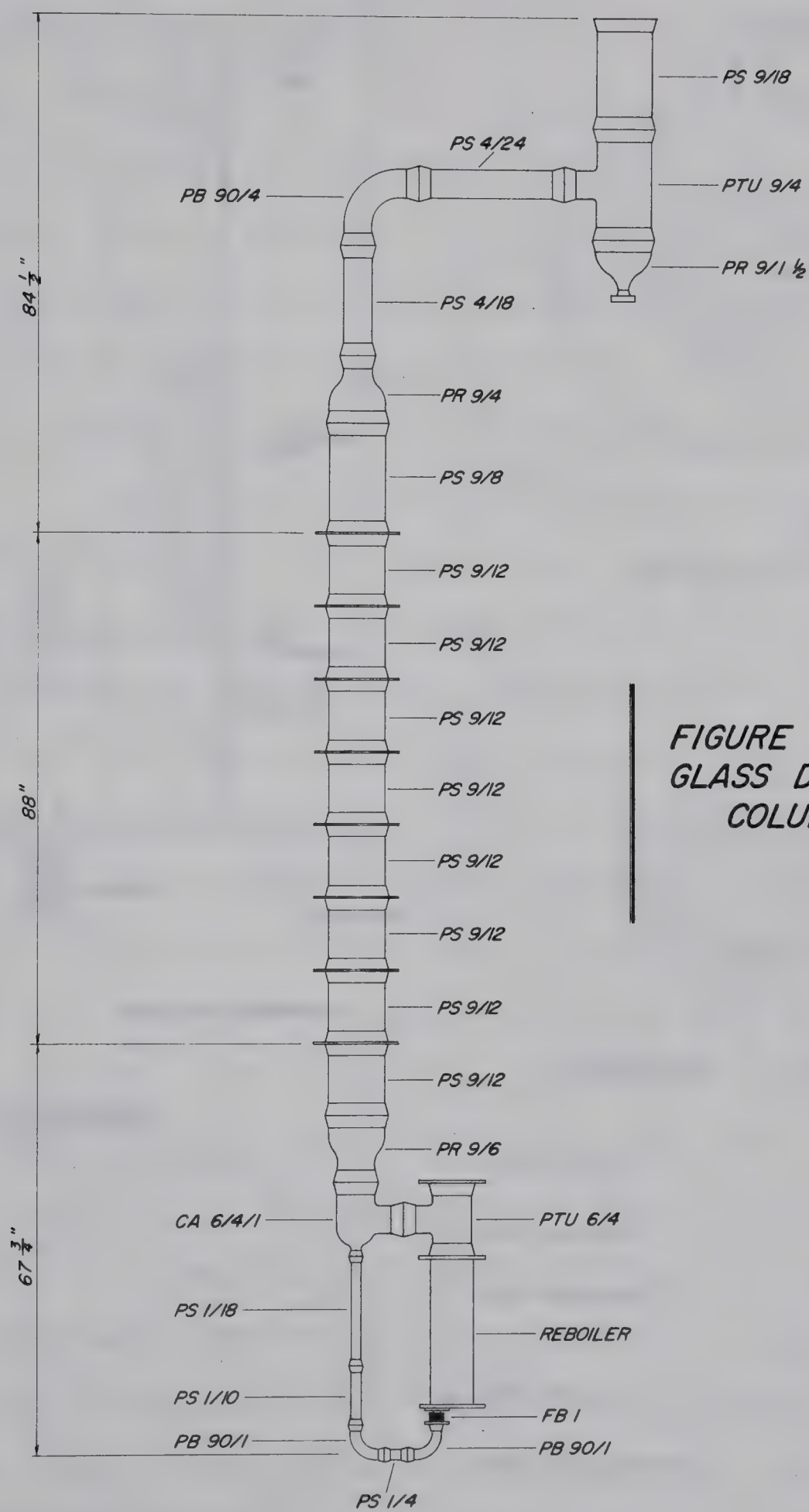
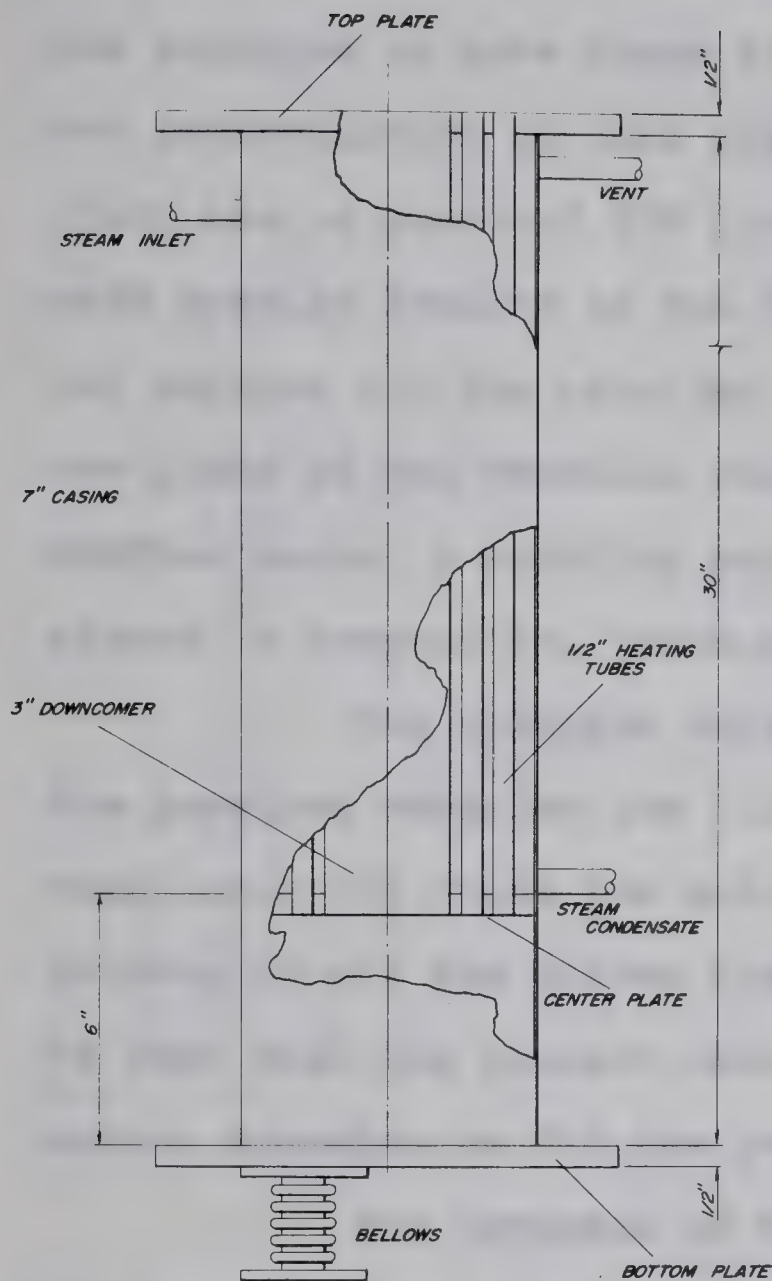
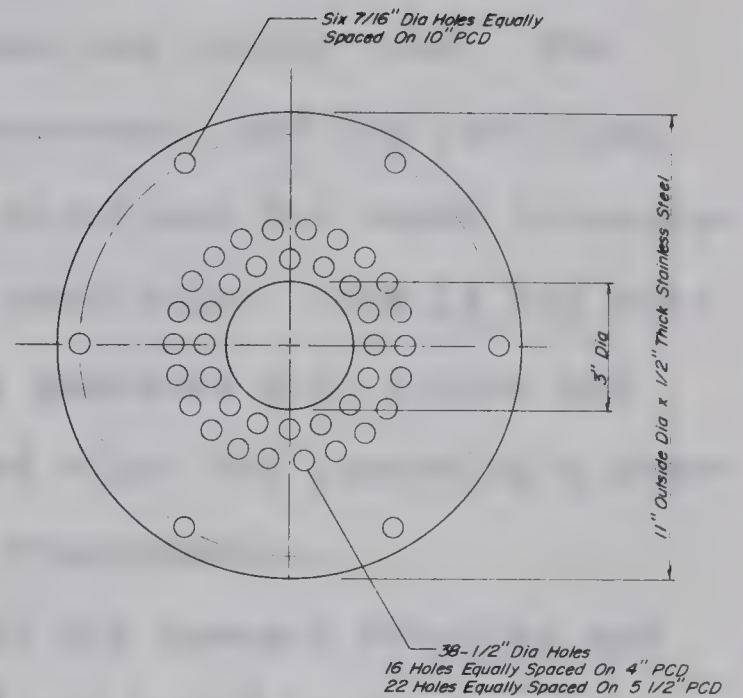


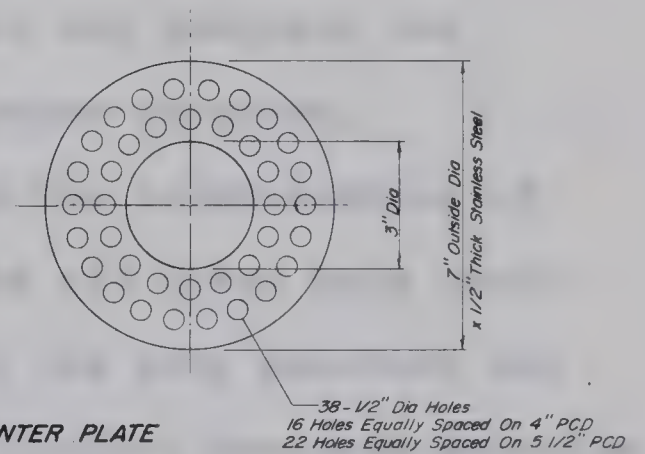
FIGURE 13
GLASS DISTILLATION
COLUMN



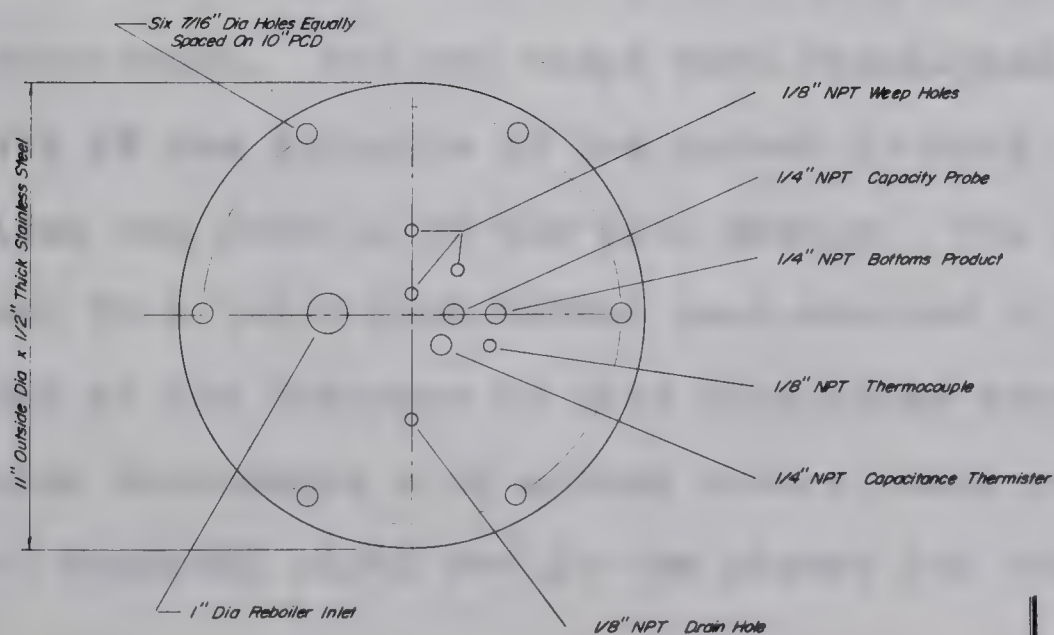
REBOILER ASSEMBLY



TOP PLATE



CENTER PLATE



BOTTOM PLATE

FIGURE 14
REBOILER

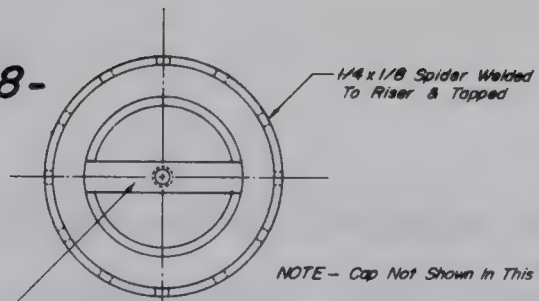
The large diameter tube in the center allows the heating of the solution to take place in the outer one-half inch tubes and recirculation to take place down the center tube. The glass tee, a standard QVF glass component, and the remaining void spacing leading to the first plate are the vapor discharging section for the reboiler. Of particular note is the bottom plate of the reboiler which is provided with inflow and outflow ports, a sampling port, and holes for inserting a thermistor, a composition probe and a thermocouple.

The solution hold-up of the present reboiler and the previous reboiler are 0.25 ft^3 and 1 ft^3 , respectively. When comparing these two solution hold-ups to the solution hold-up of all the column trays and condenser ($.6 \text{ ft}^3$) it can be seen that the present reboiler would not dominate the column dynamics as did the previous larger reboiler.

For purposes of this study the refabrication of the trays was of major importance. The old trays were provided with only one hole for sampling of the tray solution and one hole for the thermocouple used to monitor the tray solution temperature. The new trays were redesigned with the measurement of the dynamics of the column in mind. Figure 15 provides the details of the tray design. The tray consisted of four $2\frac{1}{4} \times 1\frac{7}{8}$ inch bubble caps mounted in a square pattern. Some of the features of this particular tray design are circular downcomers with splash covers, caps over the feed parts and Woodruff slots cut in the plates for the thermocouples.

FIGURE 15
BUBBLE CAP TRAY

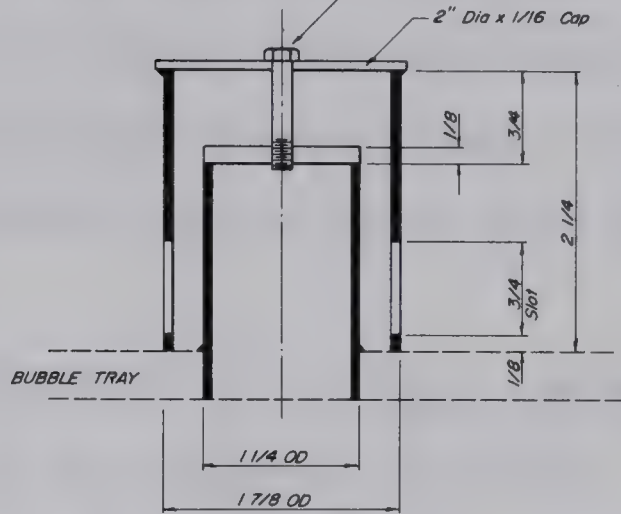
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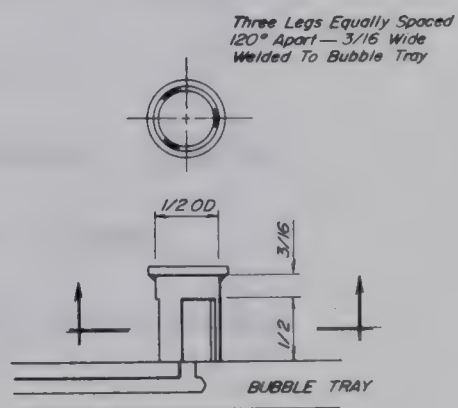
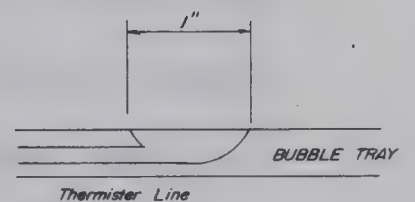
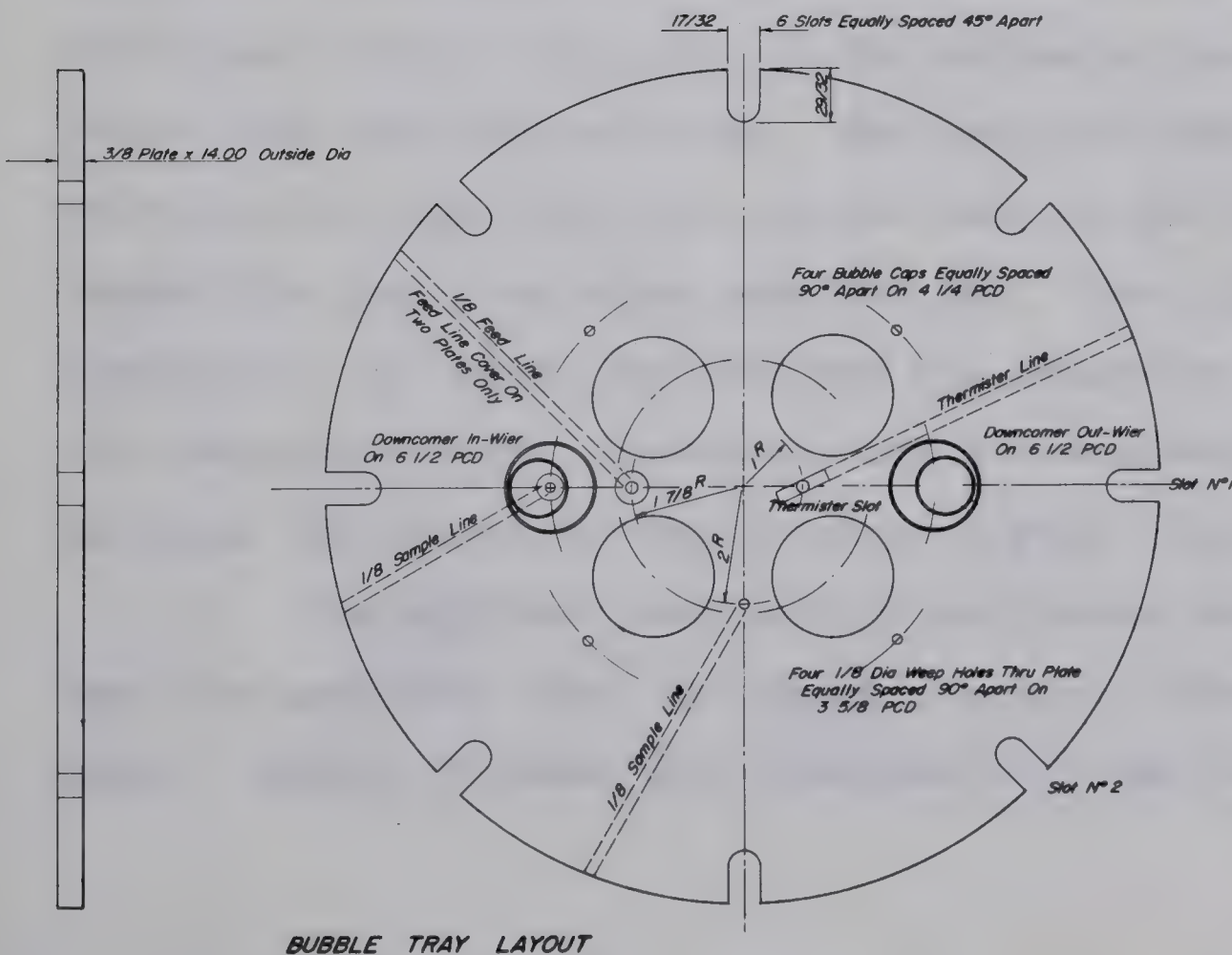
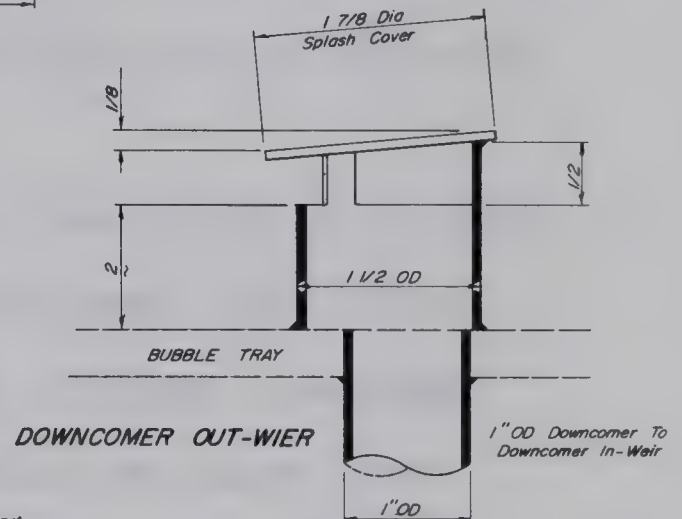
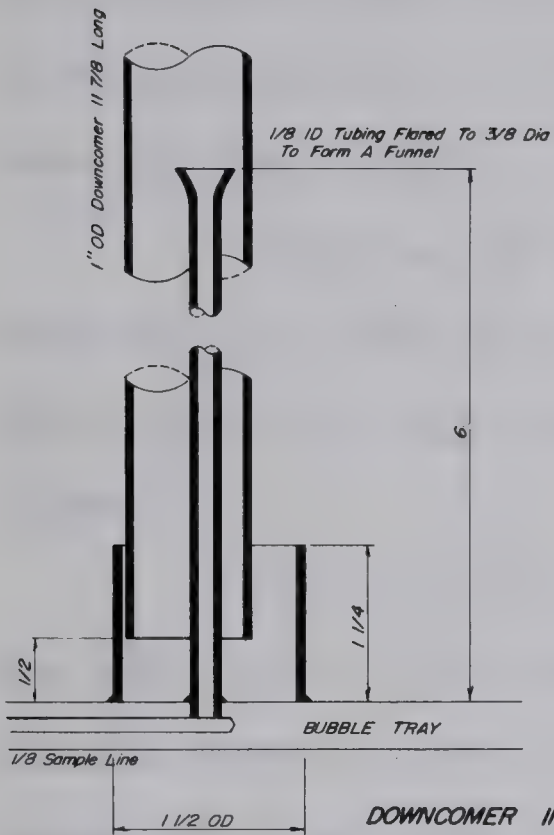
12 Slots 3/4 x 3/32
Equally Spaced 30° Apart

N° 5 Machine Screw

2" Dia x 1/16 Cap



BUBBLE CAP



The purpose of the splash-cover located above the downcomers was to minimize the movement of foam between the trays. On the other hand, the caps over the feed ports had the effect of dispersing the feed, thus improving the mixing of the fresh feed as it entered the feed tray. The woodruff slots ensured that the thermocouples did in fact protrude into the liquid phase.

Sampling of the liquid on the tray was done directly from the tray and from the downcomer of the tray. The sampling facilities and the location of the sampling ports is shown on Figure 15.

Modifications to the condenser consisted of replacing the copper tubes with stainless steel tubes and increasing the surface area of the condenser by fitting a maximum number of tubes into the nine inch diameter by three foot long glass shell. The plate on the bottom of the vertical glass sheet was also modified. The original brass plate had provision for only the high and low legs of the liquid level transmitter and a solution sampling tap. This plate was replaced with one which provided for the insertion of a composition measuring probe, thermistor and a thermocouple. Figure 16 shows the details of this stainless steel plate.

The original feed product and bottom product tanks were replaced with four, two hundred gallon, glass lined tanks. Figure 17 shows the arrangement of the two feed tanks

LIQUID LEVEL TRANSMITTER

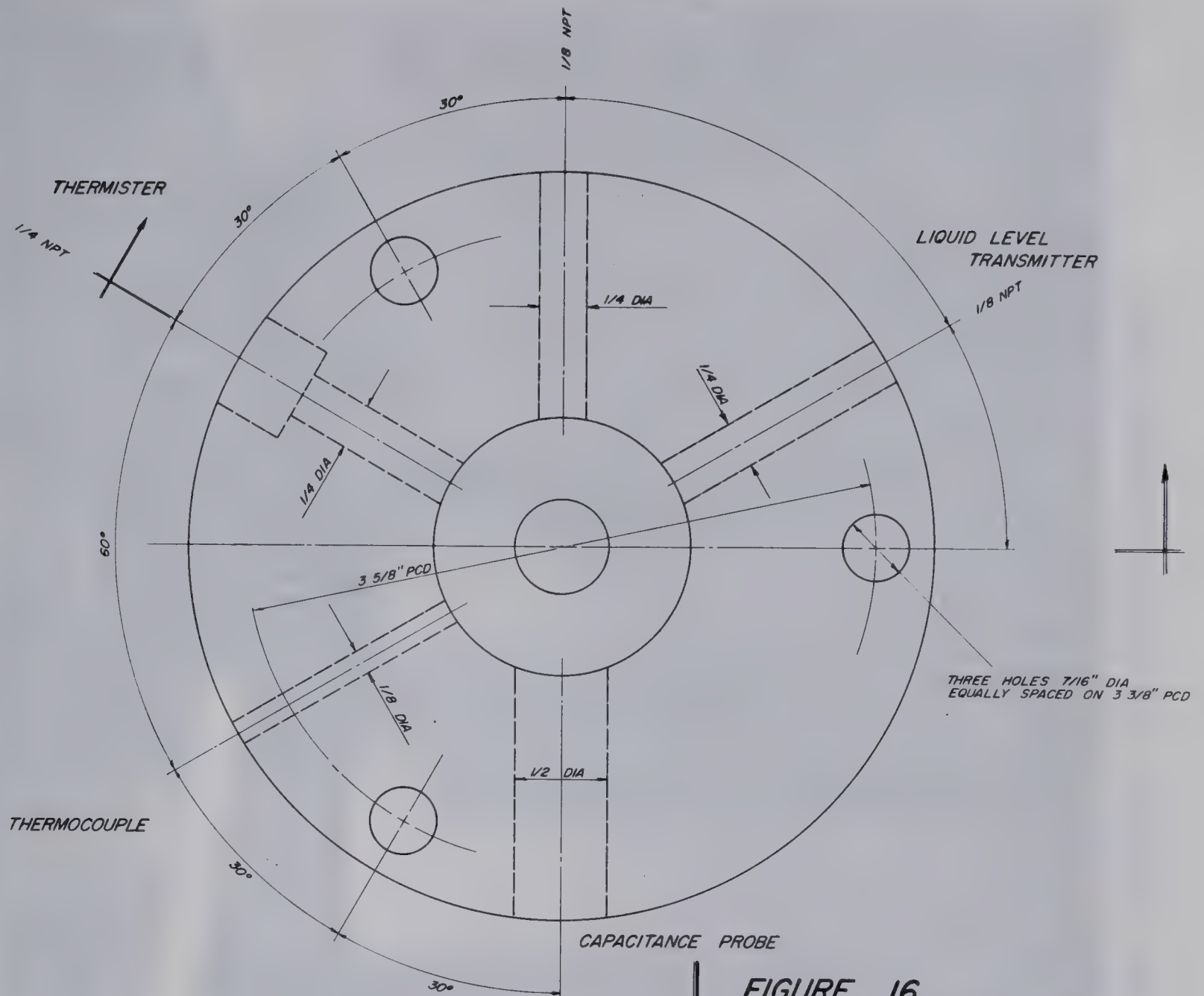
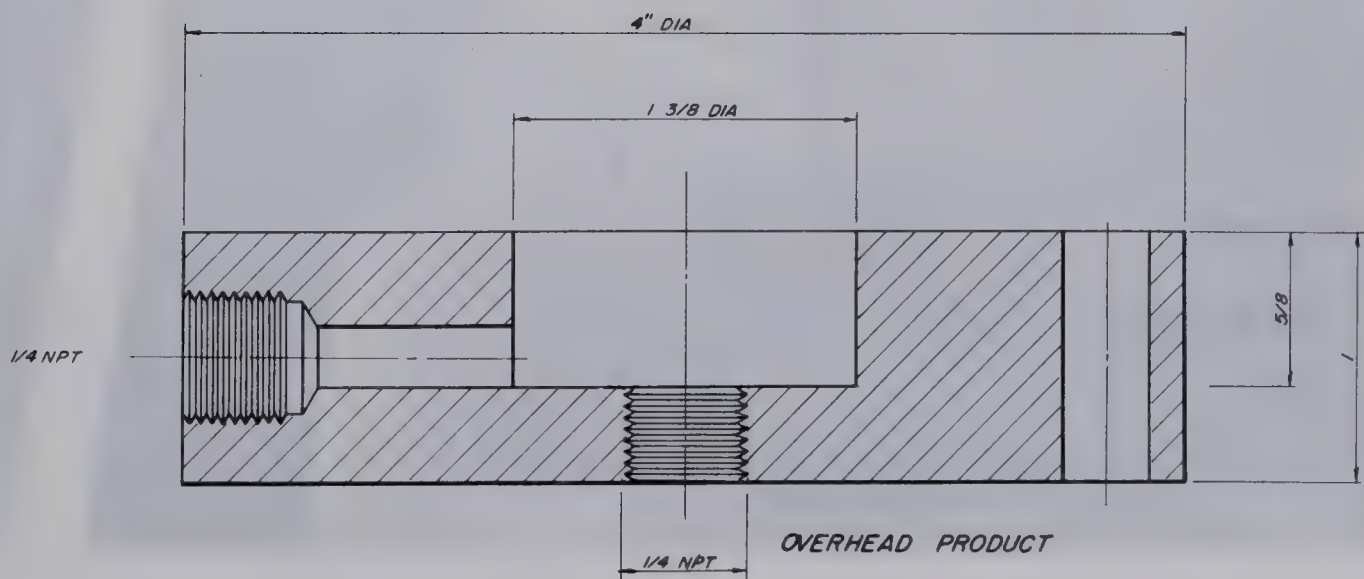


FIGURE 16
CONDENSER BOTTOM
PLATE



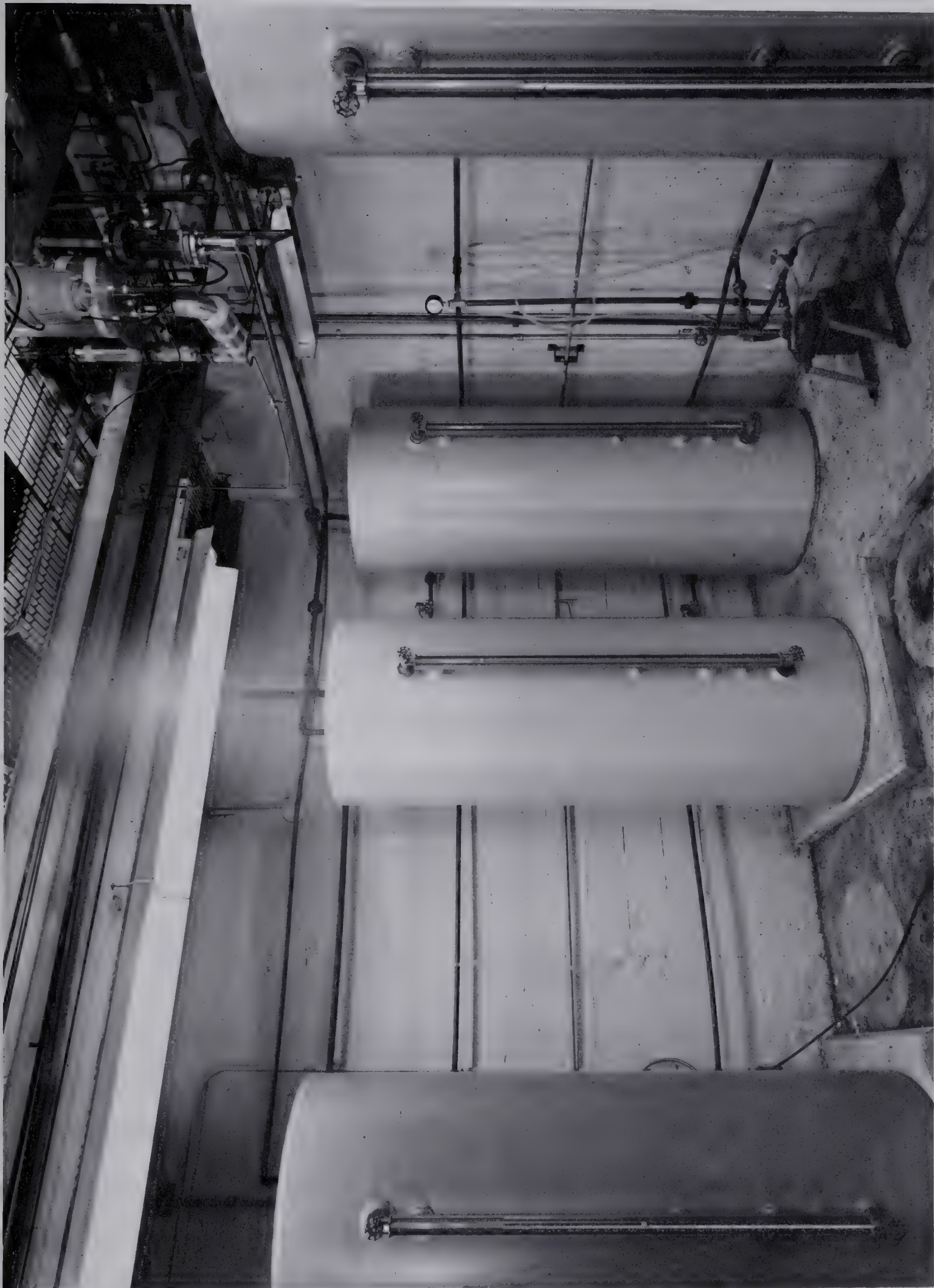


Figure 17 Feed, Bottoms, and Product Storage Area

(Center), product tank (right) and bottoms product tank (left). Four hundred gallons of feed allowed for about thirty hours of continuous running time, hence a number of experimental runs could be performed.

Preheaters were installed on the feed and reflux lines. These preheaters were standard, single pass, tube and shell Ross heat exchangers⁽⁴⁵⁾.

B. Control

The controllers and control configurations present on the old distillation column were utilized to the fullest extent. This equipment is shown in Figure 11. In addition to the control equipment already present, it was necessary to add a feed temperature controller, a reflux temperature controller, a composition controller on the overhead product, additional temperature recording equipment, and the composition recording equipment. This equipment is shown on Figure 12.

Figure 18 is a complete control diagram for the distillation column. It is interesting to note two possibilities in arranging the column control equipment, depending of course on the purpose of the experiment. Before a discussion of the possible ways of combining the control loops is undertaken a brief description of each control loop present on Figure 18 is given in Table 1.

FIGURE 18
CONTROL DIAGRAM

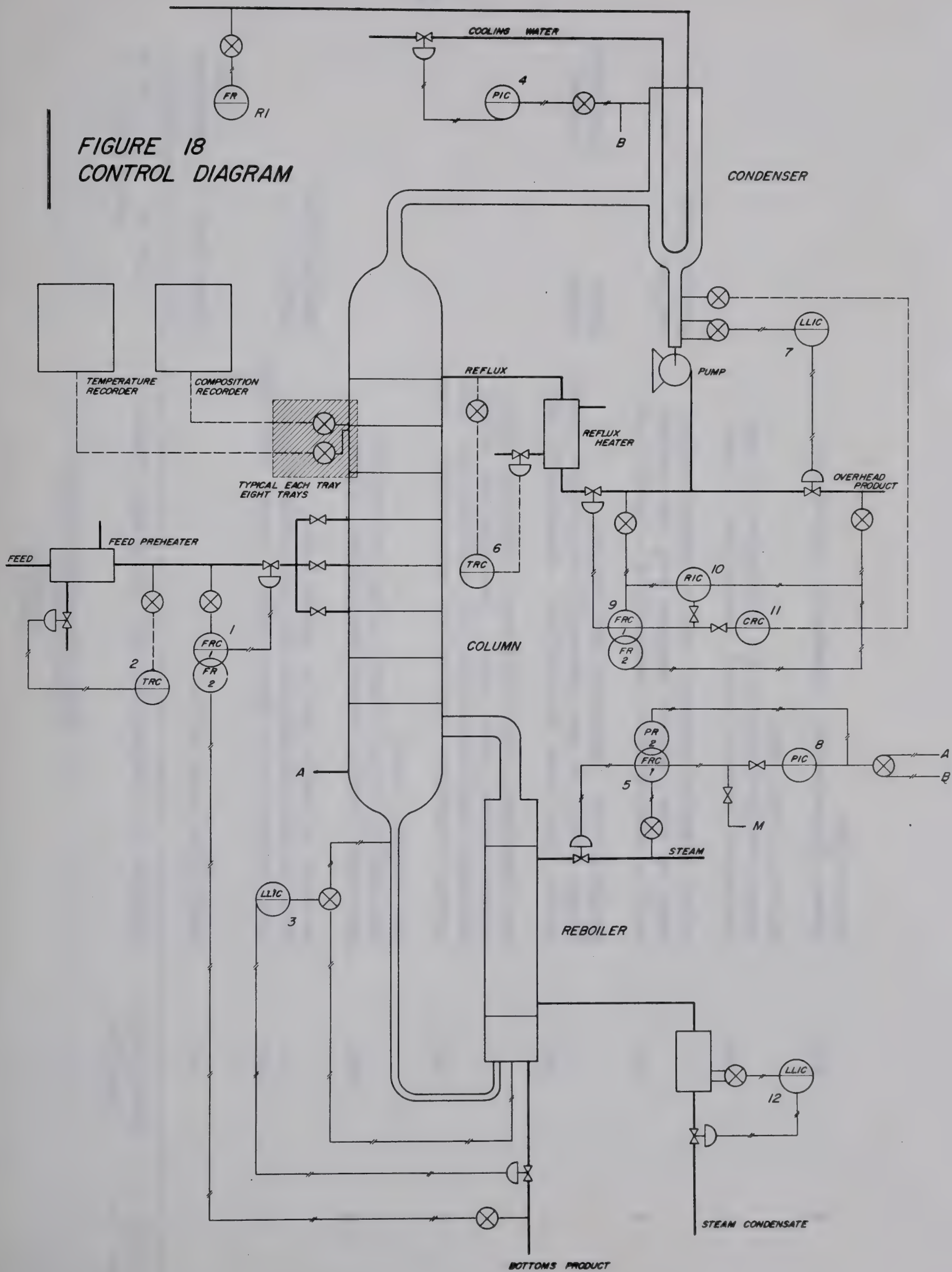


Table 1

Column Control Loops

No. On Figure 18	Function Designation	Purpose of Controller and Relevant Comments	Recording	
			Pen 1	Pen 2
1	FRC	Feed flow rate controller	Feed Flow	Bottoms Flow
2	TRC	Feed temperature controller - steam was used as the heating medium and the temperature sensing element was a thermistor	Feed Temperature	
3	LLIC	Reboiler liquid level controller - the bottoms flow rate was varied to control the liquid level		
4	PIC	Column pressure indicating controller - the pressure was controlled by varying the condenser water flow rate. The cooling water was recording on a separate recorder (R1)		
5	FRC	Steam flow rate controller - pneumatic set point which is set manually or by the tower differential pressure controller	Steam Flow	Column Pressure
6	TRC	Reflux temperature controller - steam was used as the heating medium and the temperature sensing element was a thermocouple	Reflux Temperature	
7	LLIC	Condenser liquid level controller - the level was controlled by variation of the product flow rate		
8	PIC	Tower differential pressure indicating controller		

No. On Figure 18	Function Designation	Purpose of Controller and Relevant Comments	Recording	
			Pen 1	Pen 2
9	FRC	Reflux flow rate controller - pneumatic set point which is set either by the composition controller or the reflux ratio controller	Reflux Flow	Product Flow
10	RIC	Reflux ratio indicating controller		
11	CRC	Composition Recording Controller	Overhead Composition	
12	LLIC	Reboiler steam condensate liquid level controller		

The first configuration used the reflux ratio controller (control loop 10) and the tower differential pressure controller (control loop 8). The reflux ratio controller maintained the reflux ratio constant by adjusting the reflux flow controller set point. The tower differential pressure controller adjusted the set point of the steam flow controller. This configuration maintained the overhead composition for a change in steam quality, but had the disadvantage of being unable to correct for changes in feed flow rate, feed composition, and feed temperature.

Configuration two consisted of removing the reflux ratio controller and tower differential pressure controller and substituting the composition recording controller. The steam flow controller set point was set manually. This configuration maintained the desired composition of the overhead product regardless of the upsets experienced by the column.

For clarity only one composition and temperature measuring system (shaded portion of Figure 18) is shown. There was, however, a composition measuring cell on each tray, in the reboiler and in the condenser liquid.

Temperature measurements were taken at the following points:

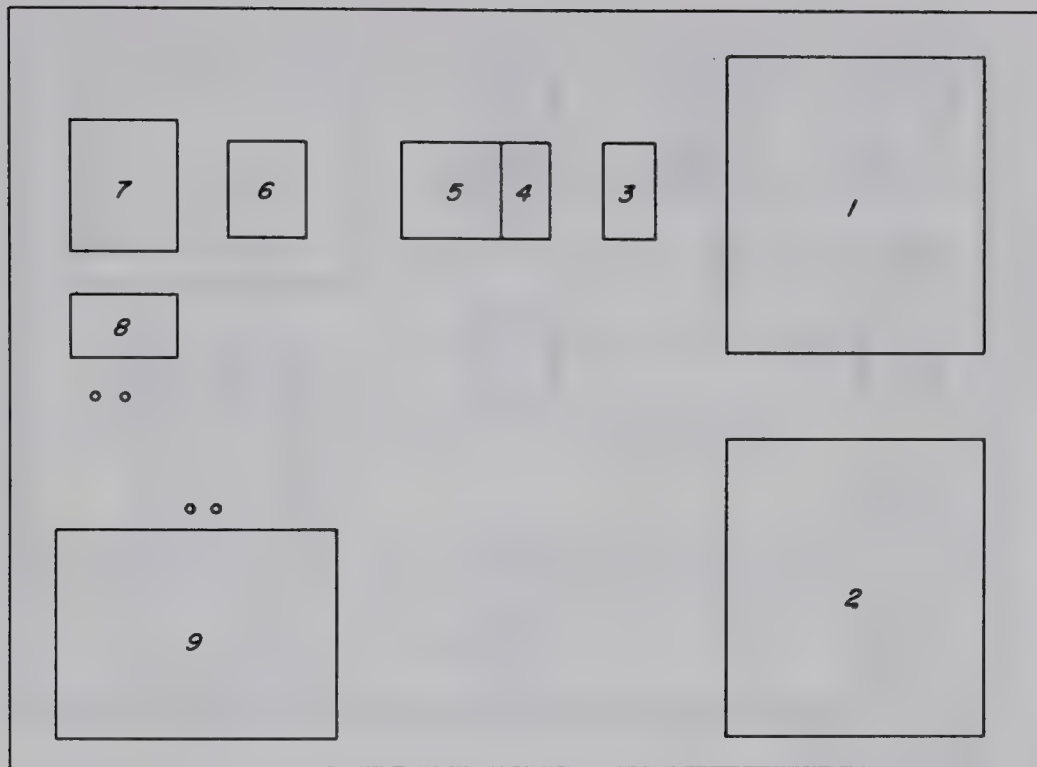
- a) on each individual tray;
- b) feed stream;

- c) reboiler solution;
- d) reflux stream entering the top plate of the column;
- e) condenser liquid;
- f) steam entering the reboiler;
- g) steam condensate;
- h) cooling water inlet;
- i) cooling water outlet.

Figures 19 and 20 show the layout of the control panels and a list of the equipment used. Figure 20 is the original panel while Figure 19 is the auxiliary panel in which the additional equipment required for this study was mounted. Hence, Figure 19 shows the mounting of the composition recording dynalog, composition of the overhead recording and controlling dynalog, the feed temperature controller, and the reflux temperature controller.

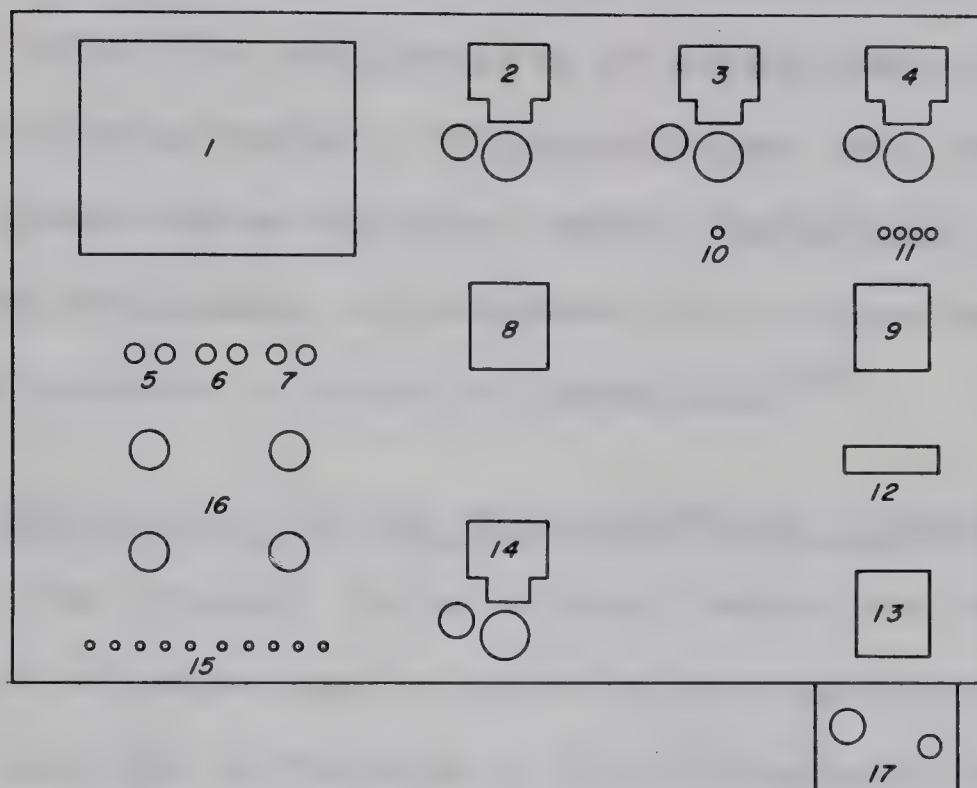
C. Composition Measurement by Measurement of Solution Capacitance

As an analytical measurement for laboratory work dielectric constant has been known for many years^(46,47,48). Its application to industrial processes had to await the development of a stable and reliable capacitance measuring instrument designed for process work. The first such instrument made its appearance about 1926 when a system was put into operation for measuring weight per unit area of automobile tire fabric coming from the calenders where the web is coated



- 1 *FOXBORO MODEL 9855 NC (SEQ. B) CAPACITANCE DYNALOG RECORDER*
- 2 *FOXBORO MODEL M/9850 NC CAPACITANCE DYNALOG RECORDER & CONTROLLER*
- 3 *FOXBORO TYPE 693 EMF TO CURRENT CONVERTER*
- 4 *FOXBORO MODEL 62 CONTROLLER*
- 5 *FOXBORO MODEL 6420 DF-0 TWO PEN RECORDER*
- 6 *HONEYWELL MODEL 30020-0-0-0-0-0-0 EMF TO CURRENT CONVERTER*
- 7 *HONEYWELL MODEL 32311-6-0-0-0-0-0 SINGLE PEN RECORDER*
- 8 *HONEYWELL MODEL 3333Z-3-0-0-1-0 CONTROLLER*
- 9 *AUTOMATIC TIMING & CONTROLS INC TYPE 28058007A15XX RESET TIMER*

FIGURE 19
PRIMARY CONTROL PANEL
LEGEND



- 1 HONEYWELL MODEL 15305836-24-01-1-000-607-10-062 MULTIPOINT TEMPERATURE RECORDER
- 2 FOXBORO MODEL 58P4 WC DIFFERENTIAL PRESSURE INDICATING CONTROLLER
- 3 FOXBORO MODEL 58P5 WC TOWER PRESSURE INDICATING CONTROLLER
- 4 FOXBORO MODEL 58P4 WC CONDENSER LIQUID LEVEL INDICATING CONTROLLER
- 5 FEED PUMP SWITCH
- 6 CONDENSER PUMP SWITCH
- 7 BOTTOM PRODUCT PUMP SWITCH
- 8 FOXBORO MODEL 5822 TS FEED FLOW RATE RECORDING CONTROLLER & BOTTOM PRODUCT FLOW RATE RECORDER
- 9 FOXBORO MODEL 5422 PS REFLUX FLOW RATE RECORDING CONTROLLER & PRODUCT FLOW RATE RECORDER
- 10 VENT SOLENOID VALVE SWITCH
- 11 TOTAL REFLUX-RATIO REFLUX SWITCHES
- 12 FOXBORO MODEL 57ZSR REFLUX RATIO INDICATING CONTROLLER
- 13 FOXBORO MODEL 5422 PS STEAM FLOW RECORDING CONTROLLER & TOWER DIFFERENTIAL PRESSURE RECORDER
- 14 FOXBORO MODEL 58P4 WC REBOILER LIQUID LEVEL INDICATING CONTROLLER
- 15 FEED, BOTTOMS, PRODUCT & WATER SOLENOID SWITCHES
- 16 AIR PRESSURE REGULATOR VALVES & GAUGES
- 17 STEAM FLOW MANUAL SET POINT

FIGURE 20
SECONDARY CONTROL PANEL
LEGEND

with layers of rubber⁽⁴⁹⁾. Other processors, seeing the advantages of weighing by capacitance, quickly applied the instrument to a variety of other sheet materials.

With the availability of capacitance measuring instruments a wide variety of applications have been possible. Some of these are as follows: water content in acetone; monitoring the efficiency of reformers for octane improvement^(50,51) and water content in granular materials⁽⁵²⁾.

1. Application to the Methanol-Water System

The primary factors which determine whether capacitance of a solution can be used to measure the solution composition are the difference in the dielectric constants of the pure components of the solution and the construction of a cell to measure the composition changes. In the case of methanol-water, the dielectric constants at 20°C⁽⁴⁹⁾ are 32 and 80 respectively. With the three-fold differences in dielectric constants, one would expect this method of composition measurement to be satisfactory. Figure 21, which is a plot of capacitance versus weight percent methanol at various temperatures, clearly indicates both the effect of temperature and composition change on capacitance. The solution capacitance represented by the dashed line on Figure 21 are for saturated liquid solutions of methanol-water. In order to eliminate this temperature effect, the capacitance measuring dynalog is provided with an automatic temperature compensation. This

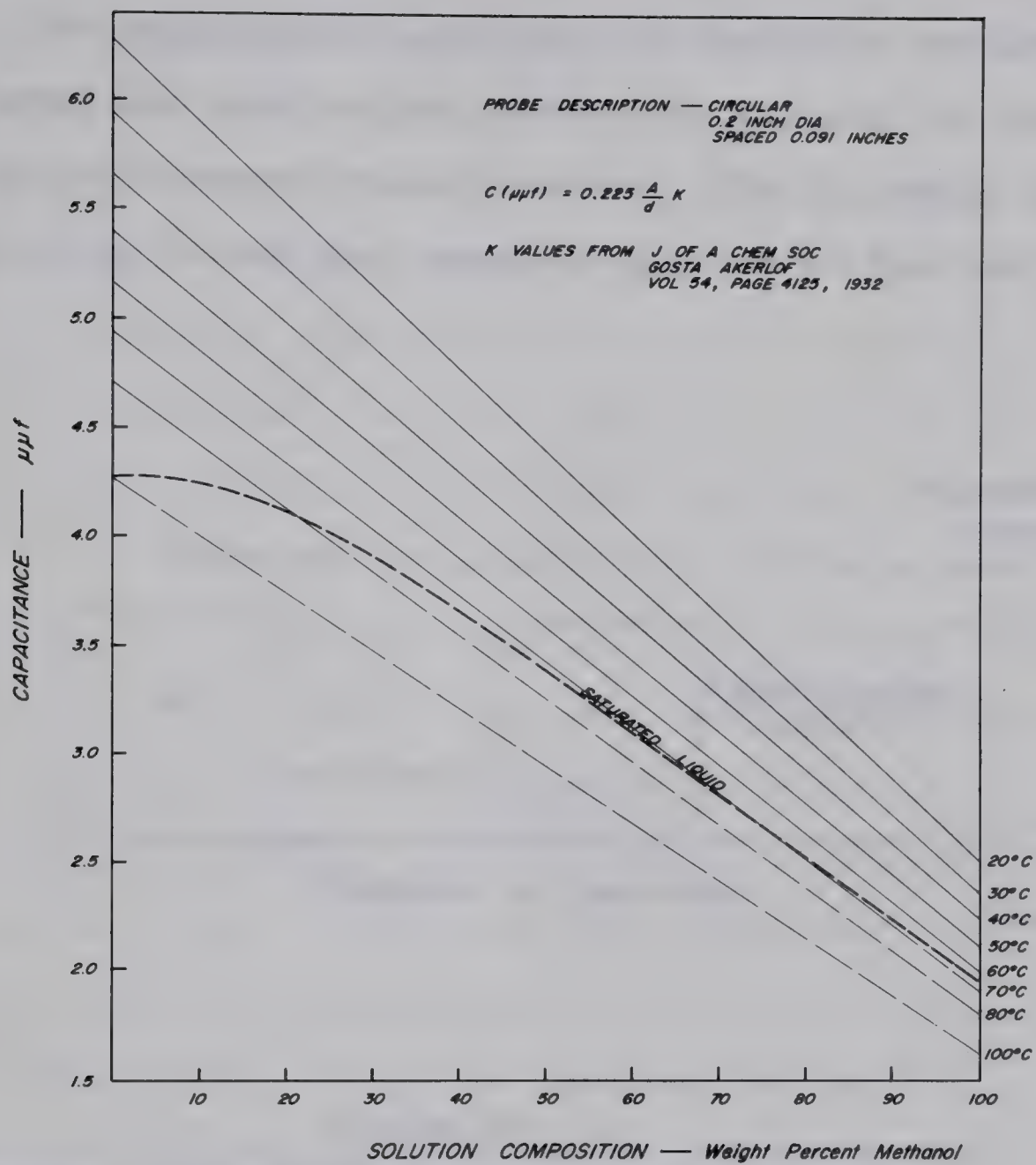


FIGURE 21
CAPACITANCE OF WATER-METHANOL SOLUTIONS

means that the capacitance measurement is referenced along a constant temperature line.

The capacitance measuring and recording equipment for the trays and reboiler was specially designed for this project by the Foxboro Company Limited. The following figure, Figure 22, is a "black box" assembly diagram of the equipment.

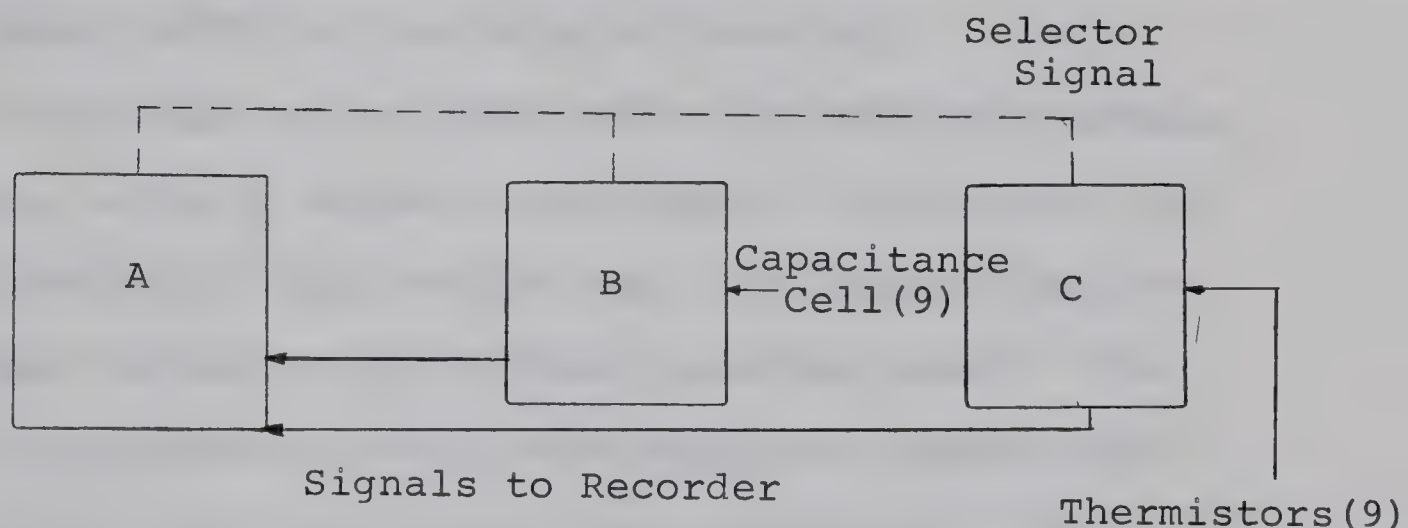


Figure 22
Arrangement of Capacitance Measuring Equipment

Component A contained the Model 9600B capacitance recording dynalog. Through the action of a cam timer arrangement this instrument controlled the selection of capacitance measuring heads and the temperature measuring heads.

Component B is the set of nine shielded relays that were used to select the desired capacitance measuring head.

Component C contains the temperature compensators and the associated relays that were necessary in selection of the desired temperature measuring element.

The equipment used for the measurement of the overhead composition was the Foxboro Model 9800 recording-controlling dynalog. The operation of the Model 9800 is similar to that of the Model 9600B, described above, except that the Model 9800 is a single pen, continuous recorder and controller while the Model 9600B is a multipoint recorder.

A suitable set of cells had to be designed because the measuring cells or elements supplied by Foxboro are intended for industrial application and as a consequence are far too large for use on pilot plant size equipment. The cells had to be compatible with the measuring devices and constructed such that cell losses were minimized. Due to their random effects, the presence of cell losses makes the capacitance measurement difficult. Losses effectively introduce resistance into the measuring circuit, causing the measuring element (cell) to appear as a complex impedance with capacitive and resistive components.

The procedure adopted in the selection of a suitable cell was strictly a trial-and-error approach. The approach consisted of setting up a bath, a circulation pump, and a clamp for holding the cell being tested. The first cell tested had stainless steel plates, one-quarter inch square and separa-

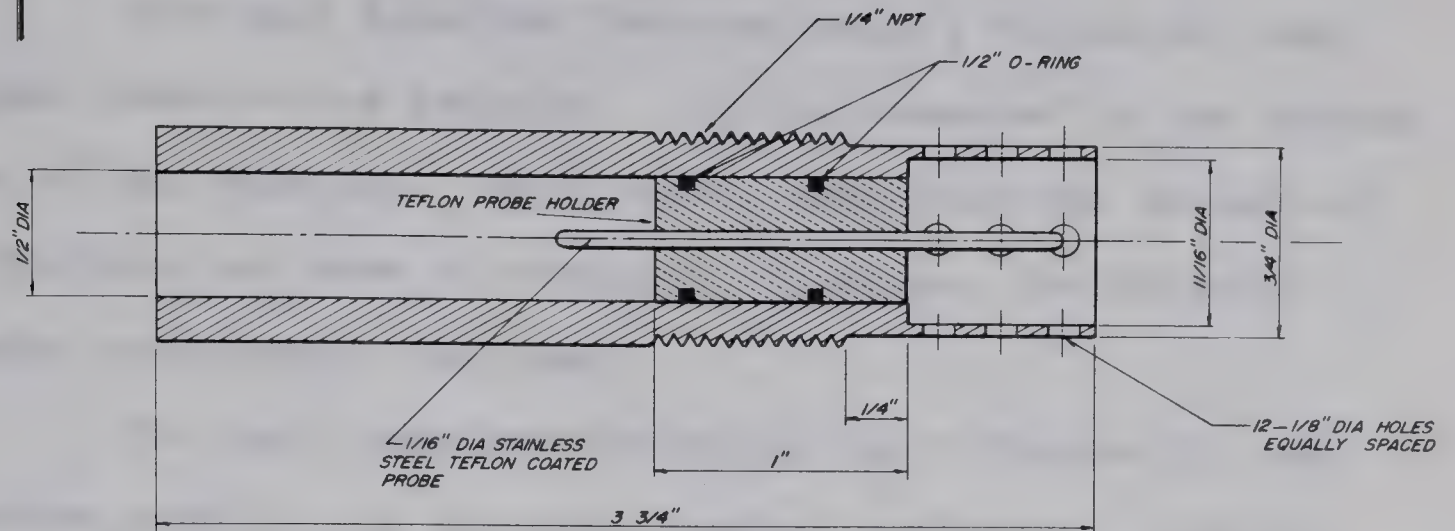
ted by a distance of $1/8$ inch. The capacitance cell was inserted into the stainless steel housing (probe holder). The probe plates were connected to the capacitance measuring heads and solution was pumped through the housing, past the plates and back to the solution reservoir. After the cell was used for a time it was noticed that the plates were corroding. This was especially noticable under conditions of high water concentrations. Another difficulty encountered with this plate type cell was the alignment of the plates in the direction of the flow. Hence, the plate type cell was abandoned.

The other commonly used type of cell is the coaxial cylindrical cell. Here the one half of the cell is a rod separated from the confining cylinder (ground) by the dielectric material whose capacitance is being measured. A cell was constructed, tested and found to be satisfactory. To overcome the problem of rusting in high water concentration solutions, the central probe was teflon coated.

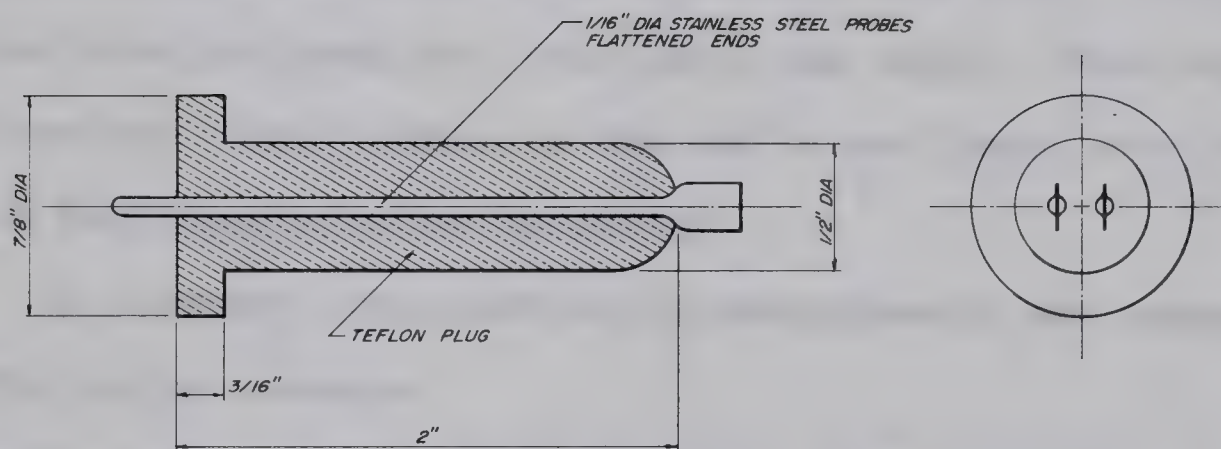
Figure 23 shows the details of the cells which were finally used. The cell labelled "Tray Cell", Figure 23, was the cell used on the trays. This cell had the advantages of being compact, easy to assemble and disassemble and the probe could be easily exchanged for one of another diameter or another length. Probe exchange was necessary because the resistance of the cell had to be about one megohm before a pure capacity was recorded.

FIGURE 23
CAPACITANCE CELLS

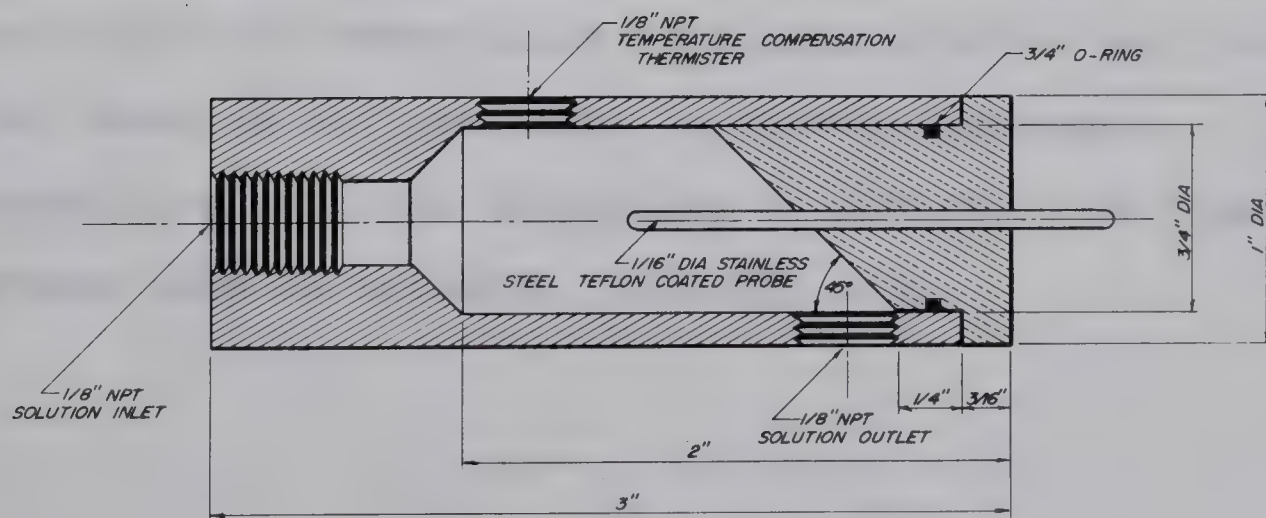
-65-



BOTTOMS CELL



CONDENSER CELL



TRAY CELL

The cell labelled "Bottoms Cell", Figure 23, was the cell used in the reboiler. It was inserted in the bottom plate of the reboiler. Here again, primarily due to ease of construction and ease of exchange of probes, the co-axial cylinder arrangement was used.

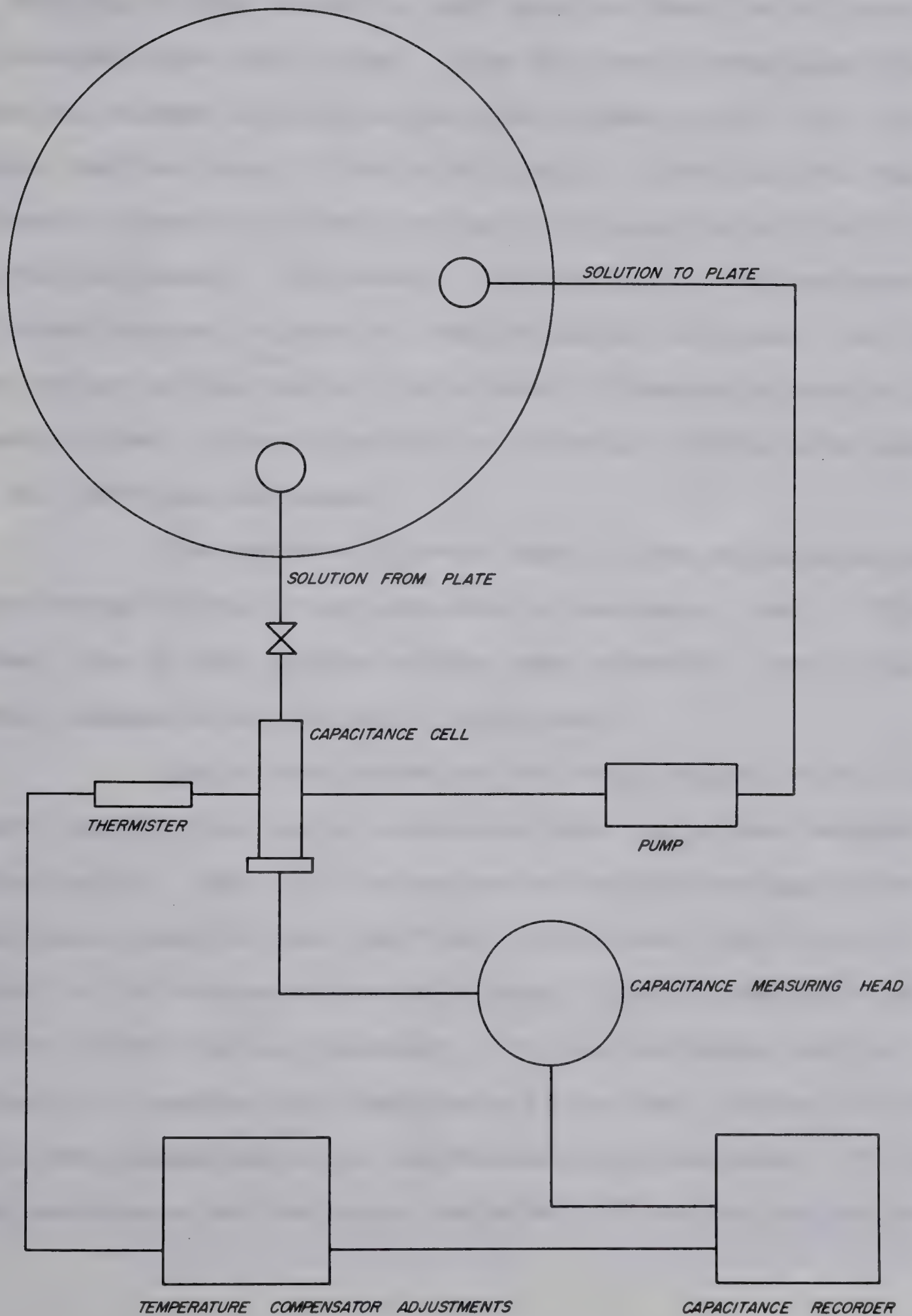
The cell labelled "Condenser Cell", Figure 23, was the probe used in the overhead product condenser. Here a plate type probe worked satisfactorily hence it was retained.

Figure 24 is a schematic of the continuous solution sampling and capacitance recording arrangement used on each tray. The solution was circulated through the cell, through a small peristaltic pump and back onto the tray. This arrangement allowed for easy access to the cells and pump, should repairs or modifications be necessary.

In summary, this method of measurement was selected for the following reasons:

- 1) Dielectric constant of water at 20°C is 80 compared to methanol at 32.
- 2) Ease of assembling and using the necessary equipment.
- 3) Size of equipment required. The density measuring equipment which is commercially available is of a very large size hence is not practical for a small column.
- 4) Prohibitive cost and difficulty of operation of other methods such as infrared, density, etc.

FIGURE 24
CONTINUOUS SAMPLING &
CAPACITY RECORDING SYSTEM



D. Operating Problems

The start up of the column required that the vent at the top of the column be left open so that the air could be removed from the column. Once this was accomplished the vent was closed and the reflux pump turned on and the trays above the feed tray filled with liquid. Since air was continually brought in with the feed, a blanket of air built up on the condenser. To prevent this fouling of the condenser of bleed system, Figure 25, was installed to bypass the blow-out system at the top of the column. By manually setting the needle valve, it was possible to maintain a continuous bleed of air from the condenser.

The peristaltic pumps used in the solution circulation system of the trays contained a neoprene liner. This liner, due to the rubbing of the pump eccentric, would rupture, necessitating periodic replacement.

During the course of the experimental work it was found that in high water concentrations the probes behaved erratically. That is, the probes in the bottoms and first tray were prone to zero shifting. This was finally attributed to the contamination with metal ions of the solution on the first tray and reboiler. The contaminants had the effect of lowering the resistance of the cell, hence, instead of a pure capacitance one was measuring a reactance. To increase the resistance and decrease the effect of contamination the



Figure 25 Condenser Blow and Bleed Arrangement

bottoms solution was discarded and fresh distilled water was added to the feed tanks. Except for the problem of zero shifting, this method of measuring solution composition was satisfactory.

V. EXPERIMENTAL PROGRAM

A. Scope of Experiments

The experimental transient response data, to be compatible with the mathematical model, were recorded for the open loop and closed loop cases. In the open loop experiments the transient response of the column solution compositions to perturbations in feed flow, feed composition, steam flow and reflux flow rate were measured. In the closed loop experiments the transient response to perturbations in feed flow, steam flow, and composition controller set point were measured.

During all the above tests the variables held constant were the column pressure, the feed temperature, the reflux temperature, and the steam inlet pressure.

The variables which were recorded during each experimental run were as follows:

- 1) The flow rates of the reflux, bottom product, overhead product, condenser cooling water, steam and feed.
- 2) The temperatures of each tray, reboiler solution, overhead condenser condensate, reboiler steam chest, reboiler steam condensate, condenser cooling water in, condenser cooling water out, feed and reflux.
- 3) The solution compositions on each tray, overhead product and reboiler.

B. Experimental Procedure

The experimental procedure consisted initially of bringing the column to steady state. Then, when the recorded compositions on the trays were no longer changing, the appropriate load disturbance was applied and the resulting changes were continuously recorded.

Composition calibration curves were determined by sampling the trays, reboiler, overhead product and feed during the steady-state period. The solution samples were then analyzed by measuring the solution density. The tables showing this data are grouped in Appendix IV.

Figure 26 shows a tracing of the charts resulting from the Model 9600B and Model 9800 dynalog composition recorders. The "Column Chart", Figure 26, shows the effect that a 25 cc. solution sample from the trays, reboiler and condenser had on the solution compositions of the trays and reboiler, while the "Overhead Product Chart", Figure 27, indicates the effect of sampling on the overhead product compositions.

The magnitude of the effect of sampling on each tray was dependent on whether the stripping section of the column was operated with a high or low methanol concentration. That is, if the column was operated with a low methanol concentration in the stripping section, the effect of sampling was most pronounced on trays three, four, and five, while the

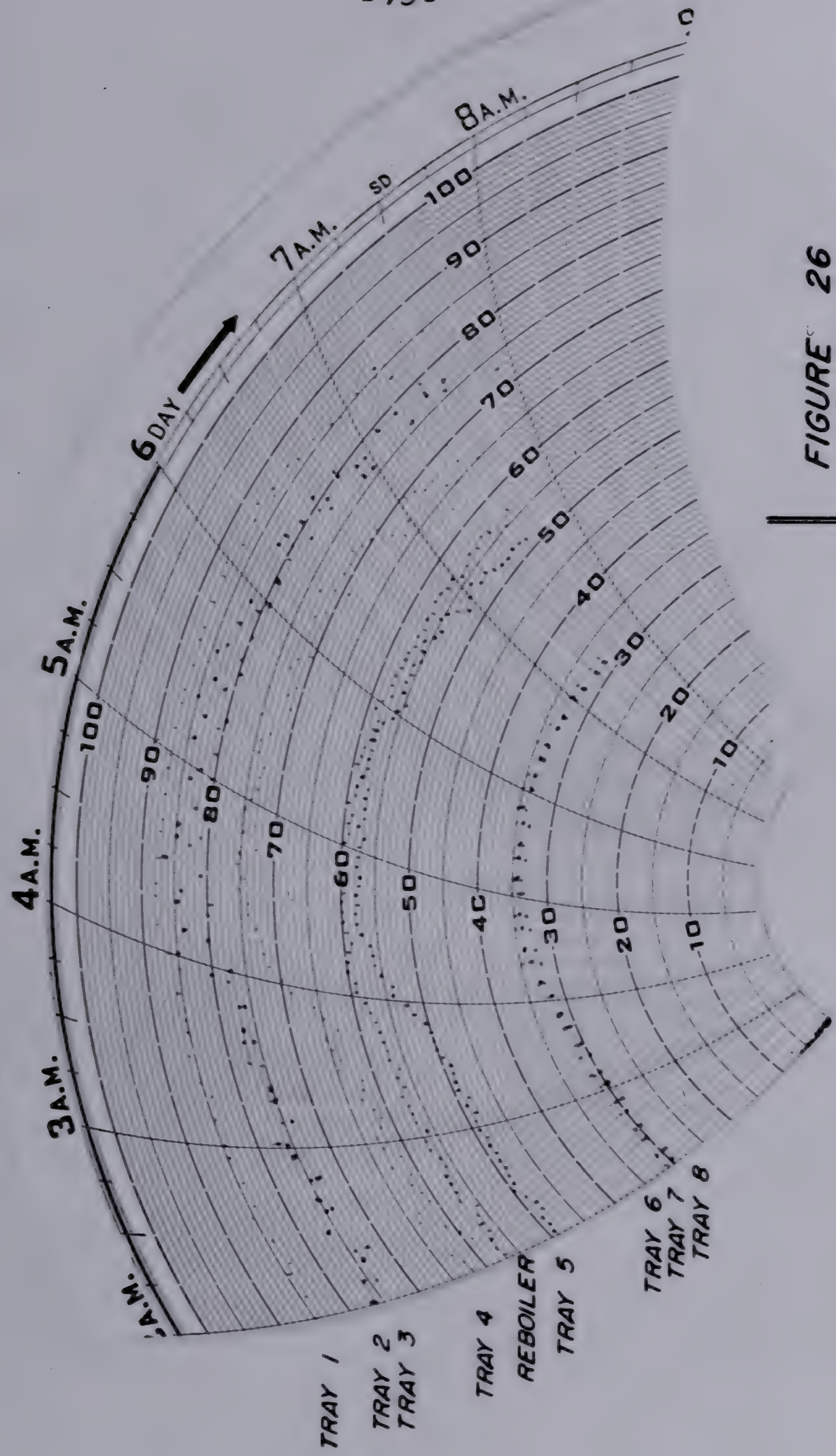


FIGURE 26
EFFECT OF SAMPLING
COLUMN CHART



FIGURE 27
EFFECT OF SAMPLING
OVERHEAD PRODUCT CHART

ends of the column were practically unaffected. This situation is illustrated by Figure 26. In the case of high methanol concentration in the stripping section, trays one, two, three, and four showed the effects of sampling to the greatest extent. In all cases, as can be seen from Figure 26, the result of sampling was to cause a decrease in the concentration of methanol in the liquid phase composition.

Figures 26 and 27 clearly illustrate the effect that removal of liquid has on the composition of the solution on the trays, in the reboiler, and in the condenser. Hence, it was necessary to avoid sampling the trays, reboiler, and condenser liquid during the transient period.

C. Reproducibility

To show the reproducibility of a transient response the following four steps in reflux flow rate were selected:

- 1) Run RR-1 was a step in reflux flow rate from 89.7 to 97.0 lbm/hr.
- 2) Run RR-2 was a step in reflux flow rate from 97.0 to 89.7 lbm/hr.
- 3) Run RR-3 was a step in reflux flow rate from 89.7 to 97.0 lbm/hr.
- 4) Run RR-4 was a step in reflux flow rate from 97.0 to 89.7 lbm/hr.

Run RR-1 (indicated with triangles) and RR-2 (indicated with circles) are shown on Figure 28. It should be noted that RR-3 is plotted only when the compositions values differed from RR-1 by more than 0.005 weight fraction. Figure 29 shows Runs RR-2 and RR-4. The same procedure was followed in plotting Figure 29 as was followed in plotting Figure 28.

The data used to prepare Figure 28 and Figure 29 can be found in tabular form in Appendix IV.

From Figures 28 and 29, it can be seen that the reproducibility was best on the trays that underwent the smallest change in composition. Furthermore, the agreement was best when the tray compositions were undergoing an increase in composition. The slight discrepancy in the results for trays one, two and three of Figure 29 can be accounted for as follows:

- 1) Error in duplication of the reflux flow rate step size.
- 2) Scatter of original raw data.

D. Determination of the Volume of Liquid on the Trays, in the Reboiler and in the Condenser

1. Volume of Liquid on the Trays

The determination of the volume of liquid on the trays proved to be a difficult task. The obvious approach of measuring the clear liquid height would not give the correct volume of liquid on the tray, since no account was made

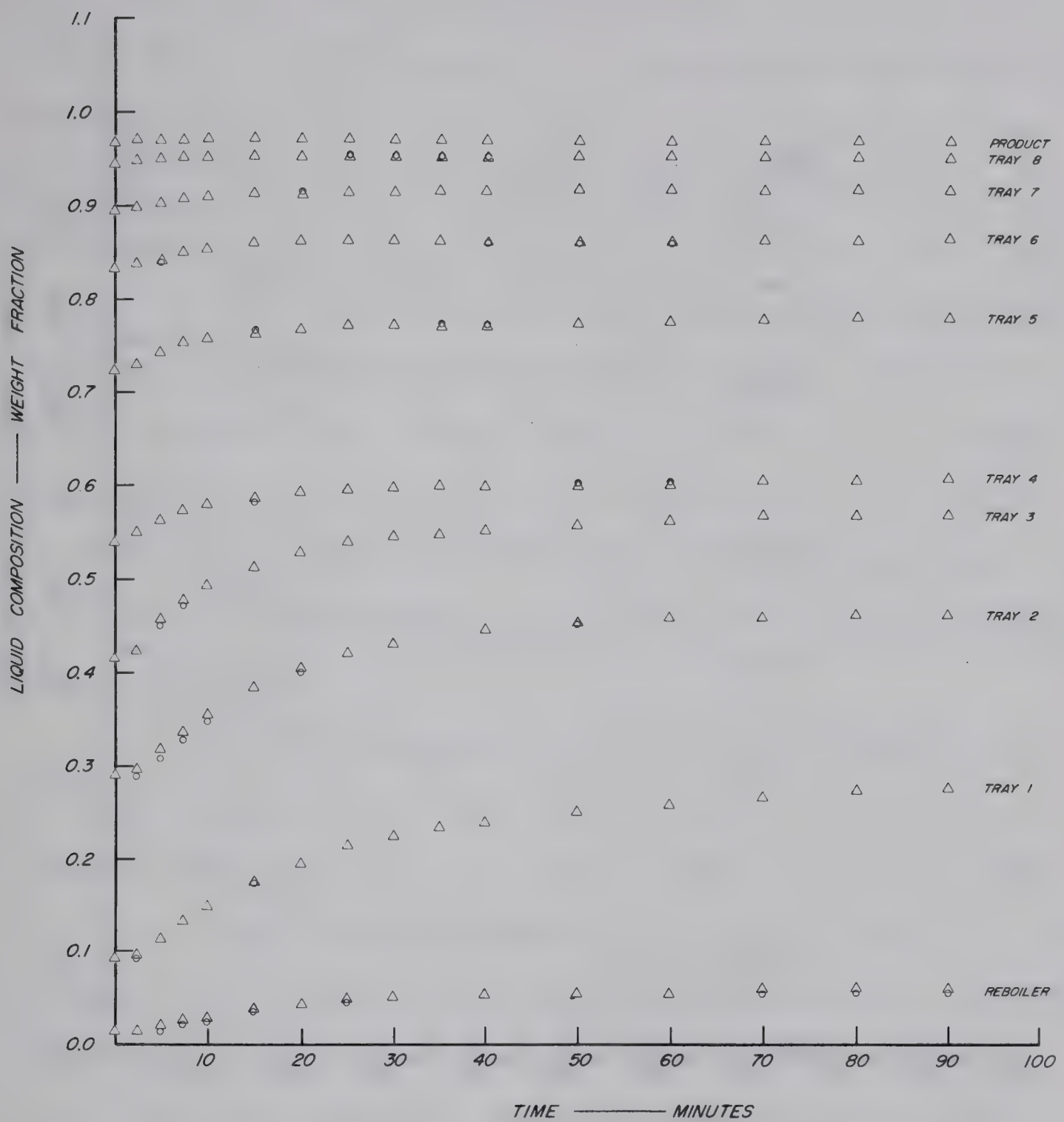


FIGURE 28
REPRODUCIBILITY
OPEN LOOP TRANSIENT RESPONSE
STEP INCREASE IN REFLUX FLOW RATE

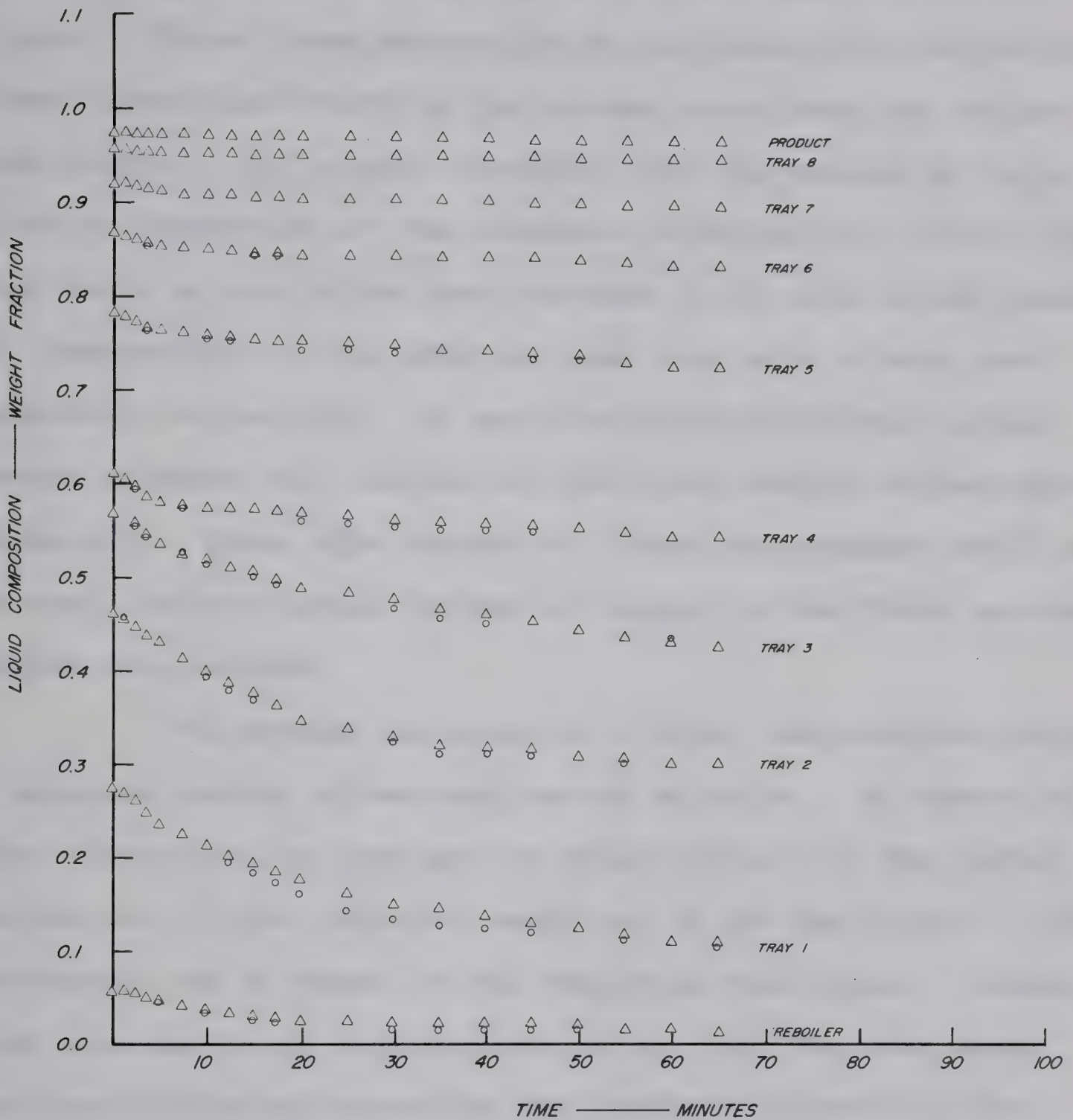


FIGURE 29
REPRODUCIBILITY
OPEN LOOP TRANSIENT RESPONSE
STEP DECREASE IN REFLUX FLOW RATE

of the liquid in the large layer of froth above the clear liquid. Table 2 was determined by estimating the heights of clear liquid and froth on the column trays when the column was running. It is only intended that the values in Table 2 give an indication of the variance in heights of clear liquid and froth as the column was operated first with a high methanol composition in the reboiler, and then with a very low methanol composition. It was noted that the clear liquid height changes very little but the froth height varies considerably. Since this method of visual measurement could not account for the actual volume of liquid in the froth another method was adopted.

The method consisted of filling the reboiler with a measured amount of methanol-water solution. By operating the column with no feed and at total reflux all the liquid boiled out of the reboiler would end up on the trays, in the condenser, or as vapor in the remaining void space. Assuming that the amount of liquid required to fill the void space was negligible and measuring the amount of liquid in the condenser and in the reboiler at the end of the run, the average volume of liquid on the trays was calculated. The volume per tray was 0.065 ft^3 . The experimental data are given in Appendix VIII.

Table 2
Height of Liquid on Trays

Tray	Liquid Height	Total Height Liquid and Froth	Froth Height
High concentration of methanol in stripping section			
1	7/8 - 1	2-3/4	1-3/4
2	1 - 1 1/4	3	2
3	1 - 1 1/4	4	3
4	1 - 1 1/4	4	3
5	7/8 - 1	3 1/2	2 1/2
6	7/8 - 1	2-7/8	1-7/8
7	7/8 - 1	2 1/2	1 1/2
8	3/4 - 7/8	2 1/2	1 1/2
Low concentration of methanol in stripping section			
1	7/8 - 1	2	1
2	1 - 1 1/4	2 1/2	1 1/2
3	1 - 1 1/4	3	2
4	1 - 1 1/4	3 1/2	2 1/2
5	7/8 - 1	2 1/2	1 1/2
6	7/8 - 1	2 1/2	1 1/2
7	7/8 - 1	2 1/2	1 1/2
8	3/4 - 7/8	2 1/2	1 1/2

All above measurements are in inches.

2. The Volume of Liquid in the Reboiler

The reboiler was filled with methanol-water solution and the column was run with no feed and no reflux. Removal of liquid, by boiling, from the reboiler, was continued until the liquid level indicator showed the normal operating level. The steam to the reboiler was turned off and the level in the return leg of the reboiler was noted. The liquid in the reboiler was drained out to this level, and the remaining liquid was measured as it was removed. The volume of liquid was found to be 0.24 ft^3 .

3. Volume of Liquid in the Condenser and Reflux System

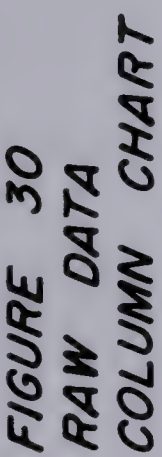
The procedure used to determine this volume consisted of removing the temperature compensation element associated with the overhead product concentration recorder and adding a measured amount of liquid to the condenser until the liquid level indicating controller showed the normal operating level. By combining this volume with the volume of the reflux system piping a volume of 0.06 ft^3 was determined. Test data and calculations are presented in Appendix VIII.

E. Composition Recorder Raw Data

The capacitance versus time data for the trays and reboiler were recorded on a Foxboro Model 9600 B capacitance recorder. An example of the type of data that were

recorded is shown in Figure 30. On Figure 30 are the nine curves which represented the change in solution composition of the liquid on the eight trays and reboiler of the column. Since the actual magnitude of the composition change, hence the chart percent change, was difficult to determine beforehand, the curves tend to cross over and thus make presentation difficult. The time scale used was four hours per chart revolution or ten minutes per large division. The calibration accuracy of the chart as specified by the manufacturer was 1 percent. Since the average slope of the calibration curves was 0.5 weight percent per chart percent the accuracy of the transient data was 0.5 weight percent.

For the overhead product composition the Foxboro Model 9800 capacitance recording controller was used to record the transient response. Figure 31 shows the response curve. In this case the calibration accuracy of the recorder was one percent and the slope of the calibration curve was 0.15 weight percent per chart percent. Hence, the accuracy of the overhead product liquid composition was 0.15 weight percent.



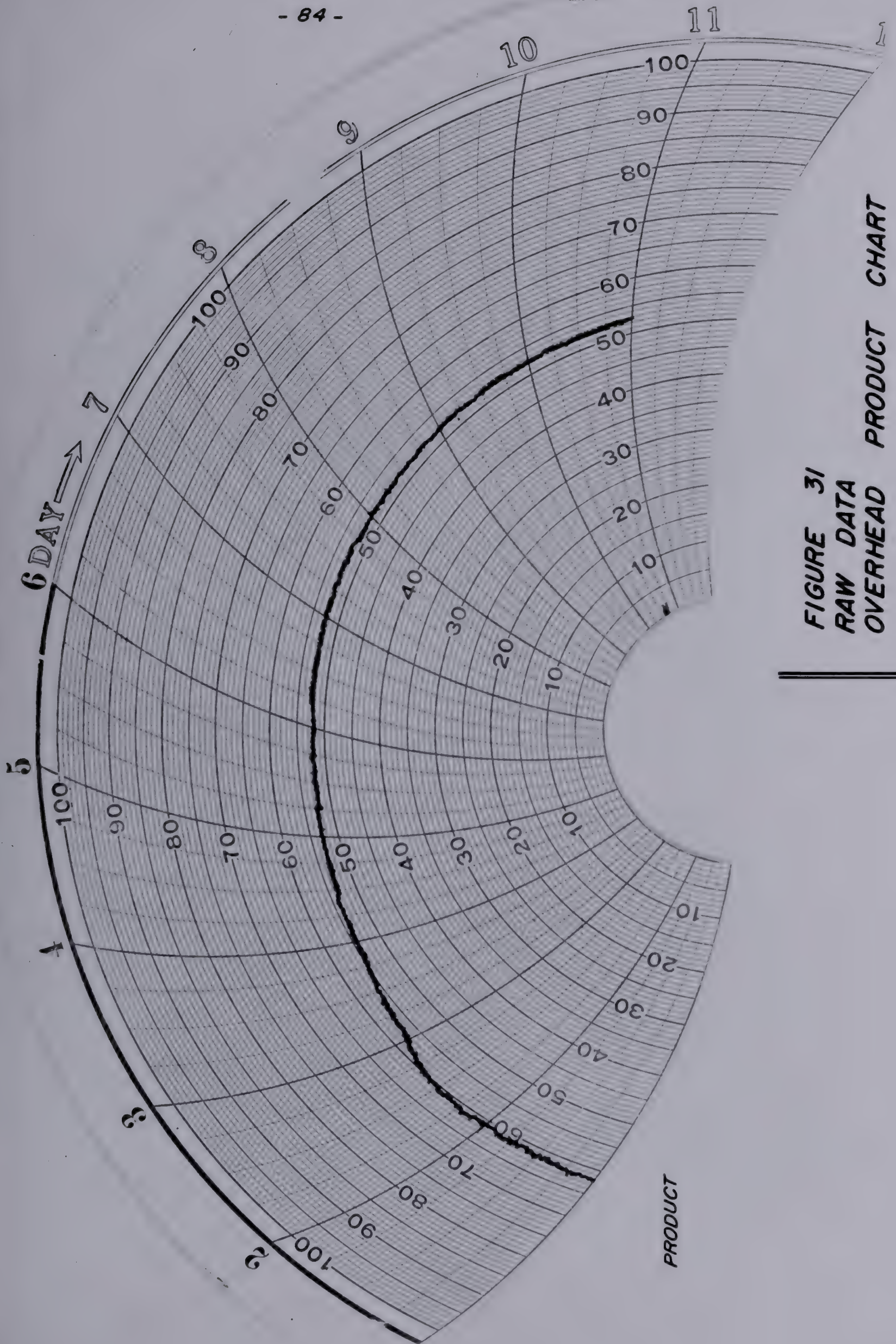


FIGURE 31
RAW DATA
OVERHEAD PRODUCT CHART

VI. COMPUTER PROGRAMS

A. Raw Data Processing Program

The raw data processing program was written to facilitate the handling of the large amount of transient response data taken. This program consisted of three subroutines: Mainline, Fit, and Data.

Subroutine "Mainline" controlled the input and execution of the remainder of the program. The input to this subroutine comprised the raw transient response data and the corresponding calibration curve data for a particular run.

Input to subroutine "Fit" consisted of the points for the abscissa (Chart %) and ordinate (Weight %) for the composition calibration curve. The subroutine used the least squares criterion to fit the calibration curves with a straight line.

In subroutine "Data" the transient response data were converted from chart percent to weight percent. The subroutine also controlled the means (on paper, on the auto-plotter, and on cards) and the format of output. The output consisted of the input and output transient response data and the calibration curve data for a particular run.

The Fortran program and data for all the experimental runs used in this thesis are presented in Appendix IV.

B. Steady State Program

The purpose of this program was to establish the steady-state or initial conditions for the unsteady state program. However, the steady state program was also used to calculate the Murphree Liquid Efficiencies from the experimental data. The experimental data included the feed flow rate, reflux flow rate, steam flow rate and quality, and the compositions of the feed, reboiler, condenser and tray solutions.

Due to errors in measurement, the experimental data do not satisfy the column overall material, component and heat balances, therefore, some form of data adjustment, which can be external or can be an integral part of the computer program, was required. A search of the literature regarding the procedures for adjustment of experimental data taken from non-linear systems proved fruitless. Hence, the following arbitrary procedures were used. The procedure used to adjust the column overall material and component balances was to assume that the feed, bottoms and product compositions, and the feed flow rate were correct as recorded and any adjustments were made in the overhead product and bottoms flow rates. Typical errors in the material balances were 2 to 4% as shown by the sample calculation of Appendix IX.

By combining equations 8 and 9, the following equations for the overhead product and bottoms flow rates were written:

$$D = \frac{F(X_F - X_B)}{(X_D - X_B)} \quad (35)$$

$$B = F - D \quad (36)$$

Using the steady state program, which incorporates equations (35) and (36), the vapor compositions, vapor and liquid flow rates within the column were calculated. From the heat balance around the reboiler, the theoretical heat load was determined using equations (37):

$$Q_T = L_n h_n + V_R H_R - B \cdot h_B - Q L_R \quad (37)$$

The actual heat load, Q_R , was the product of the heat of condensation of steam and the steam flow rate as experimentally measured. The heat loss from the column was given by equation (38):

$$Q_{HL} = Q_R - Q_T \quad (38)$$

Since the column was operated non-adiabatically, the procedure used to adjust the column overall heat balance was to distribute the heat loss as twenty percent from the reboiler and eighty percent from the rest of the column. This particular distribution was arrived at after measuring surface temperatures and calculating the convective heat losses from the surface of the column. The total heat load of the column varied from about 90,000 to 115,000 BTU/hr. while the heat loss varied between 7500 and 9000 BTU/hr. The program

did an iteration until the theoretical heat load and actual heat load balanced to within 0.002 BTU/hr. (about $2 \times 10^{-6}\%$).

Once the column overall mass, component, and heat balances were satisfied a balanced set of initial conditions had been established for the particular run. Then the vapor compositions above the trays and the reboiler, equation 6 and the following equation

$$EM_n = \frac{X_n - X_{n+1}}{XE_n - X_{n+1}} \quad (39)$$

were used to calculate the Murphree Liquid Efficiencies.

An attempt was made to correlate the Murphree Liquid Efficiencies with pertinent column parameters. The attempt consisted of using Bakowski's⁽⁵³⁾ correlation for calculating efficiencies. The experimental efficiencies were used to determine the constant used in this empirical correlation. This correlation was used in conjunction with the experimental reflux flow rate, feed flow rate, feed composition, and reflux or overhead product composition. With these variables specified, by an iteration procedure it was possible to calculate the composition of liquid on trays and vapor and liquid flow rate profiles within the column. A comparison of the experimental liquid composition profile and that predicted by the use of the Bakowski efficiency correlation was very poor. Hence, this approach was abandoned.

To assure that the data would balance at the beginning and end of each run, the Murphree Liquid Efficiencies and individual tray and reboiler heat losses were assumed to be linear functions of their respective liquid compositions.

Before the output from the steady state program was used as initial conditions in the unsteady program, one further piece of information was required. The reboiler steam chest dynamics could be ignored as seen from the theory section of the thesis and could be replaced by the appropriate steady state equations (21) and (26). These equations required an overall heat transfer coefficient (UA), and constants A and B, which were used to calculate the condensate steam enthalpy. The steady state program used the following procedure to evaluate these constants. The two overall heat transfer coefficients at the end and at the beginning of the run were averaged, the average coefficient was used to adjust the steam chest temperature slightly, equation 40.

$$T_S = \frac{Q_R}{UA_{AVE}} + T_R \quad (40)$$

Using the two adjusted steam temperatures, the average overall heat transfer coefficient, and the two reboiler liquid temperatures (experimental data) and equation 26, it was possible to calculate A and B which satisfy the end conditions of a particular run.

The steady-state program has been used to establish a set of balanced initial conditions which can now be used in the unsteady state program.

The Fortran program, programming details, and the output for the runs used in this thesis can be found in Appendix V.

C. Unsteady State Program

The equations presented in Section III, subsection B "Dynamic Model" were programmed for the IBM 7040 digital computer. The solution procedure used at each time increment was to integrate, using "Heun's first method"⁽⁵⁴⁾, the set of differential equations for the tray composition dynamics, use the newly calculated tray composition to update the liquid and vapor flows within the column, and again integrate the differential equations. The liquid composition trial values used for each integration were simply the values determined in the previous iteration. The iteration was complete when two tray composition trial values agreed to within 0.01 percent.

In order to calculate the liquid and vapor flow rates within the column from the set of linear algebraic equations presented in Appendix I, the derivatives with respect to time of the liquid phase enthalpy and liquid phase hold up were required. In the machine calculation, a first

order approximation was used to calculate the two derivatives.

The only difference between the unsteady state program for the open loop and closed loop cases was the inclusion of equations (27), (33), and (31) or (32) which were presented in subsection C of Section III.

For the unsteady state program, the following variables were given as initial conditions:

- 1) The liquid composition profile.
- 2) The average overall heat transfer coefficient for the reboiler.
- 3) The appropriate A and B (These coefficients describe the enthalpy of condensate leaving the reboiler.)
- 4) The Murphree Liquid Efficiencies for the initial and final states of the transient. Hence, a linear interpolation of the efficiencies as a function of the liquid composition can be carried out.
- 5) The appropriate feed flow rate, feed, top product and bottoms product compositions.
- 6) The variable to be perturbed.
- 7) Experimental transient data for the run.

Using the above variables as input, the unsteady state program established the same initial condition as its accompanying steady state program. The step was then applied and a transient response for the liquid compositions was calculated. These data were "outputted" on paper and the auto-plotter. The Fortran program and the theoretical results in tabular form can be found in Appendix VI.

VII. GRAPHICAL COMPARISON OF EXPERIMENTAL AND THEORETICAL RESULTS

Figures 32 through 51 show the transient response of the liquid compositions of the individual trays, product and bottoms. The coordinates used in these figures are time in minutes along the abscissa and solution composition in weight fraction along the ordinate. On these figures, the triangles represent the experimental transient response data and the broken lines represent the transient response data predicted by the mathematical model.

A. Open Loop Cases

The experimental transient response data presented on Figures 32 through 39 can be found in tabular form in Tables D-12, D-15, D-18, D-21, D-24, D-27, D-30, and D-33, respectively, of Appendix IV. The steady-state data for the open loop cases are presented in tabular form in Tables S-1 through S-8 of Appendix V. The transient response data predicted by the mathematical model can be found in tabular form in Tables U-1 through U-8 of Appendix VI.

Since the data pertaining to Figures 32 to 39 are presented and fully identified in Appendices IV, V, and VI, in the description of each figure only the perturbation size is indicated.

Figure 32 shows the transient response due to a step change in feed flow rate from 132.3 to 150 lbm/hr. while Figure 33 shows the transient response resulting from a step decrease in feed flow rate from 122.0 to 101.5 lbm/hr.

Figure 34 shows the transient response due to a step change in reflux flow rate from 125.2 to 134.1 lbm/hr. while Figure 35 shows the transient response due to a step decrease in reflux flow from 135.3 lbm/hr to 125.2 lbm/hr.

Figures 36 and 37 show the transient responses due to steps in steam flow rate from 115.5 to 107.6 lbm/hr. and 107.5 to 114.2 lbm/hr., respectively.

Figures 38 and 39 show the transient responses due to step changes in feed composition from 45.84 to 55.99 weight percent and 53.83 to 47.94 weight percent, respectively.

B. Closed Loop Cases

The closed loop experiments were done with a controller proportional band of 100 percent, integral time of 3.15 minutes, and derivative time of 3.15 minutes. As indicated in the Subsection C of Section III, Theoretical Model Development, two controller equations were available for the Foxboro Model "40" with Hyper-Reset controller. Figures 40 through 45 show the graphical comparison of the transient responses when the "Young Equation" was used for the overhead composition controller equation in the Unsteady State Program.

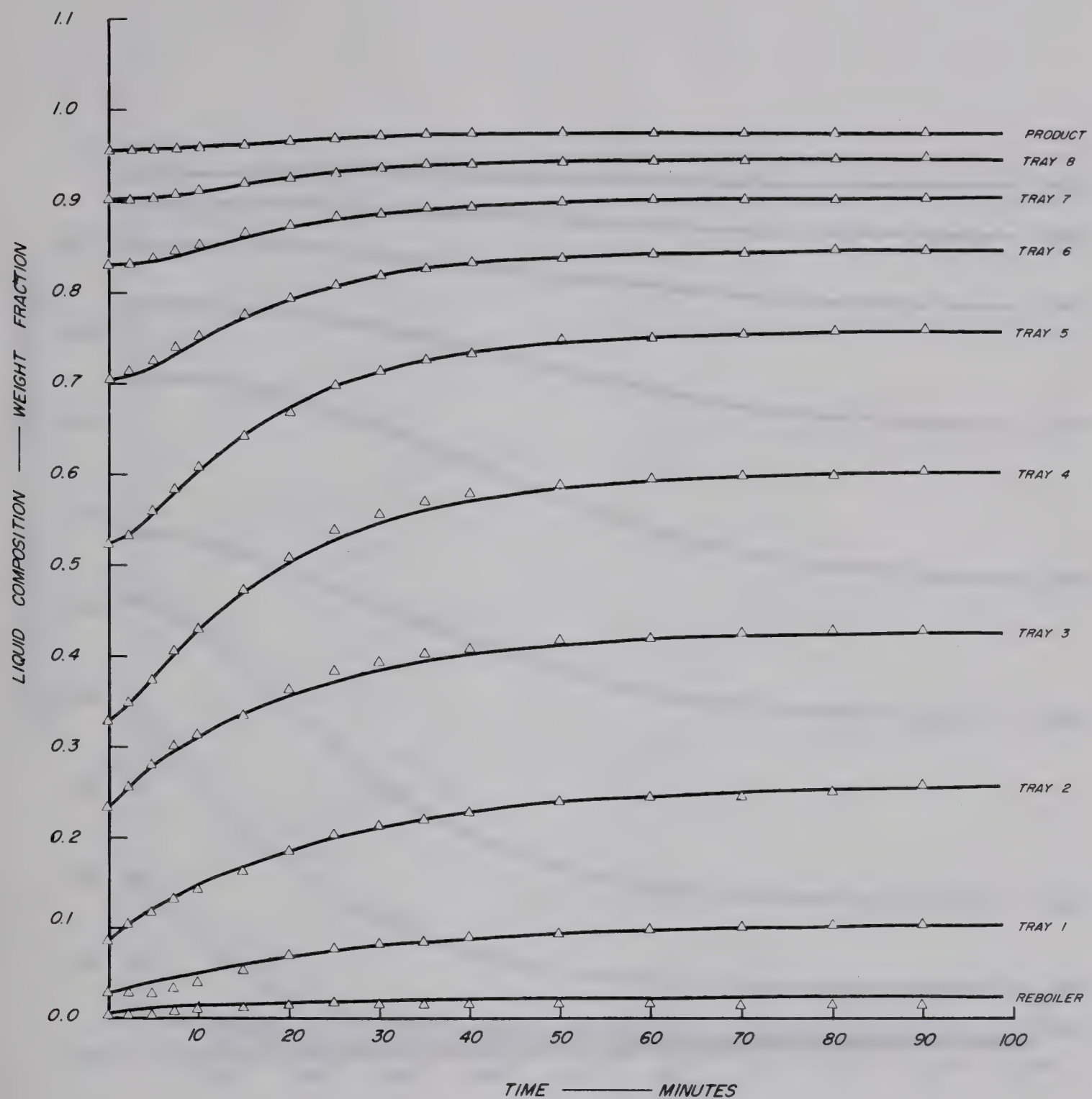


FIGURE 32
OPEN LOOP TRANSIENT RESPONSE
STEP INCREASE IN FEED FLOW RATE

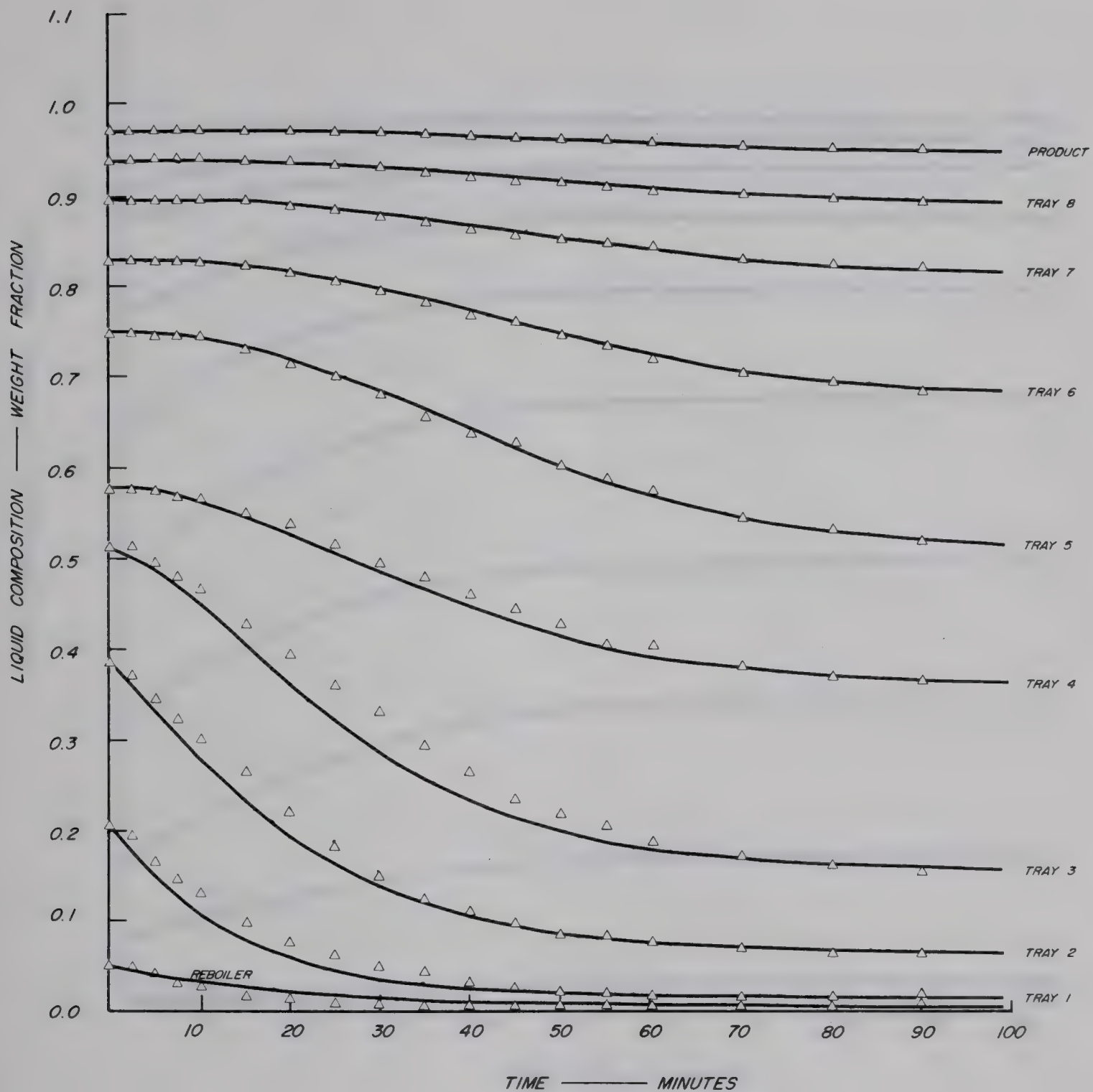


FIGURE 33
OPEN LOOP TRANSIENT RESPONSE
STEP DECREASE IN FEED FLOW RATE

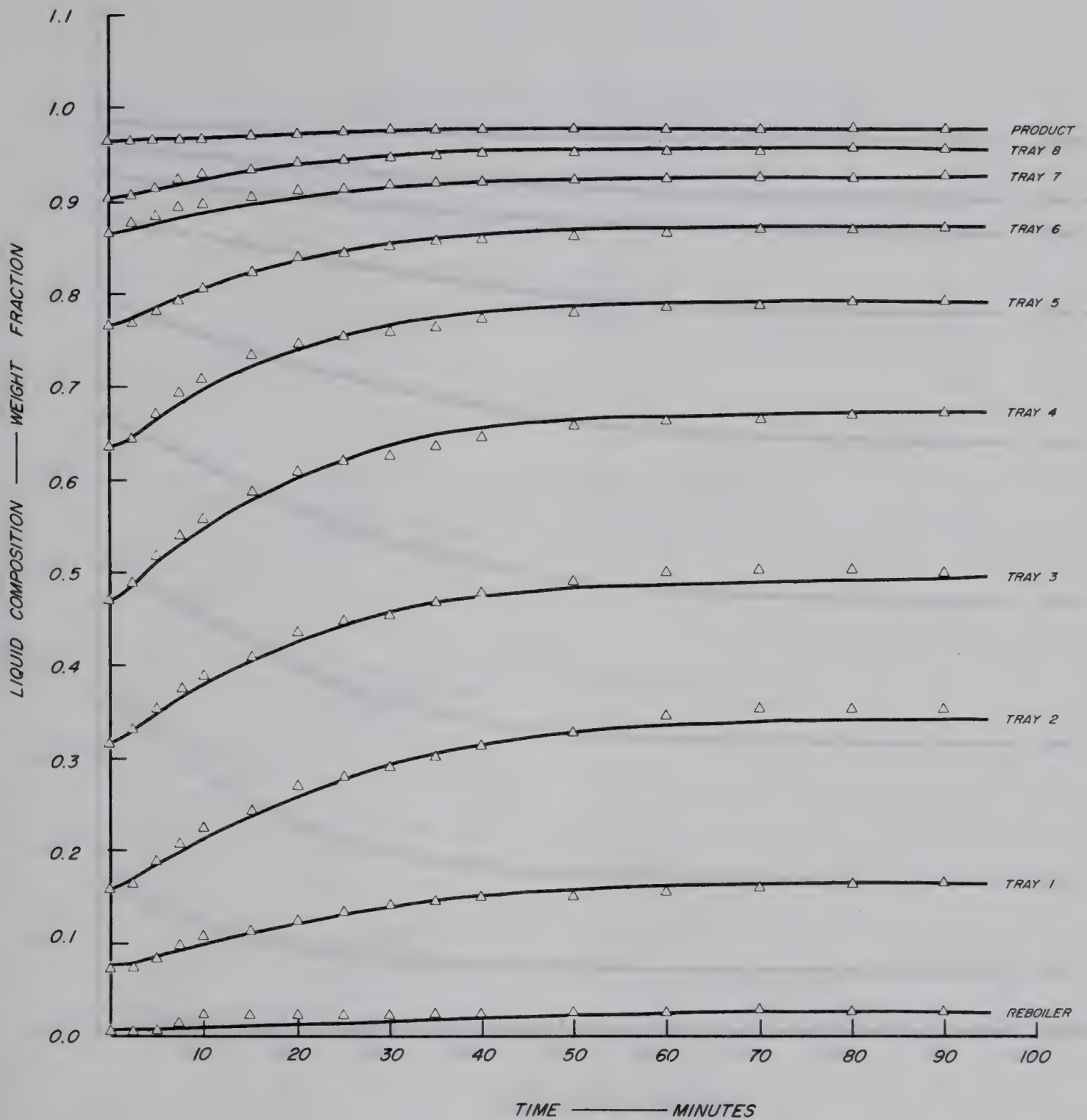


FIGURE 34
OPEN LOOP TRANSIENT RESPONSE
STEP INCREASE IN REFLUX FLOW RATE

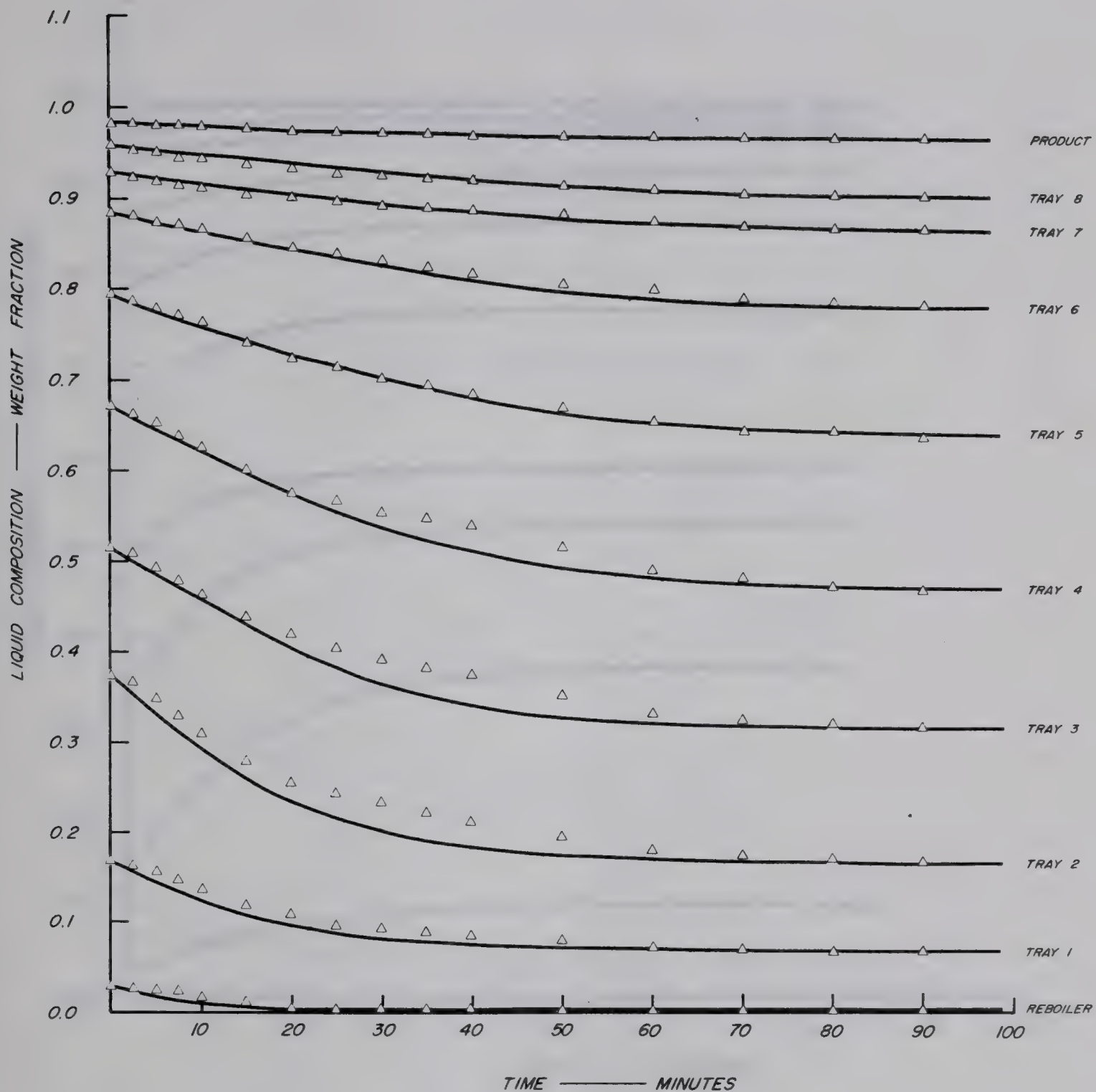


FIGURE 35
OPEN LOOP TRANSIENT RESPONSE
STEP DECREASE IN REFLUX FLOW RATE

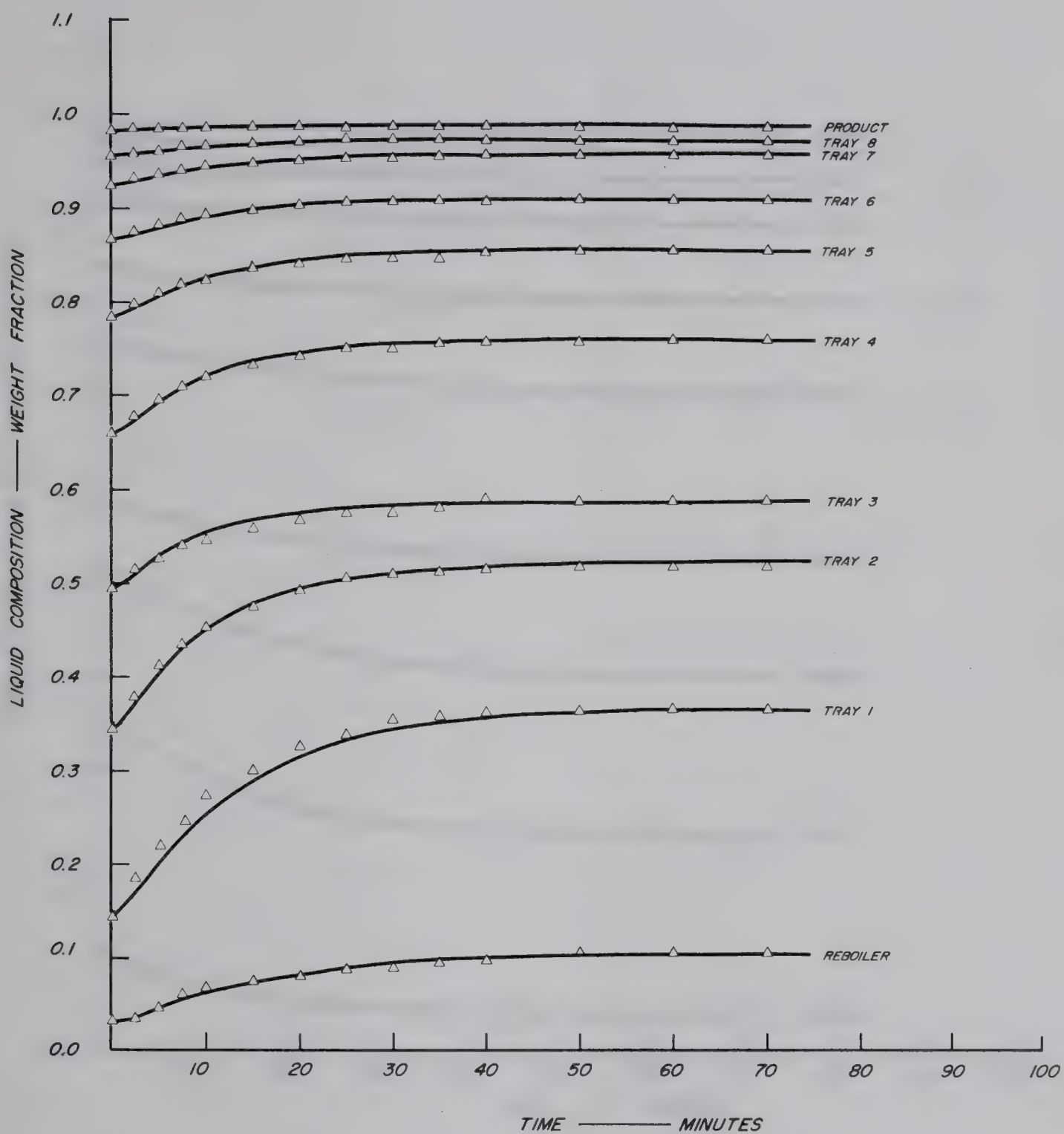


FIGURE 36
OPEN LOOP TRANSIENT RESPONSE
STEP DECREASE IN STEAM FLOW RATE

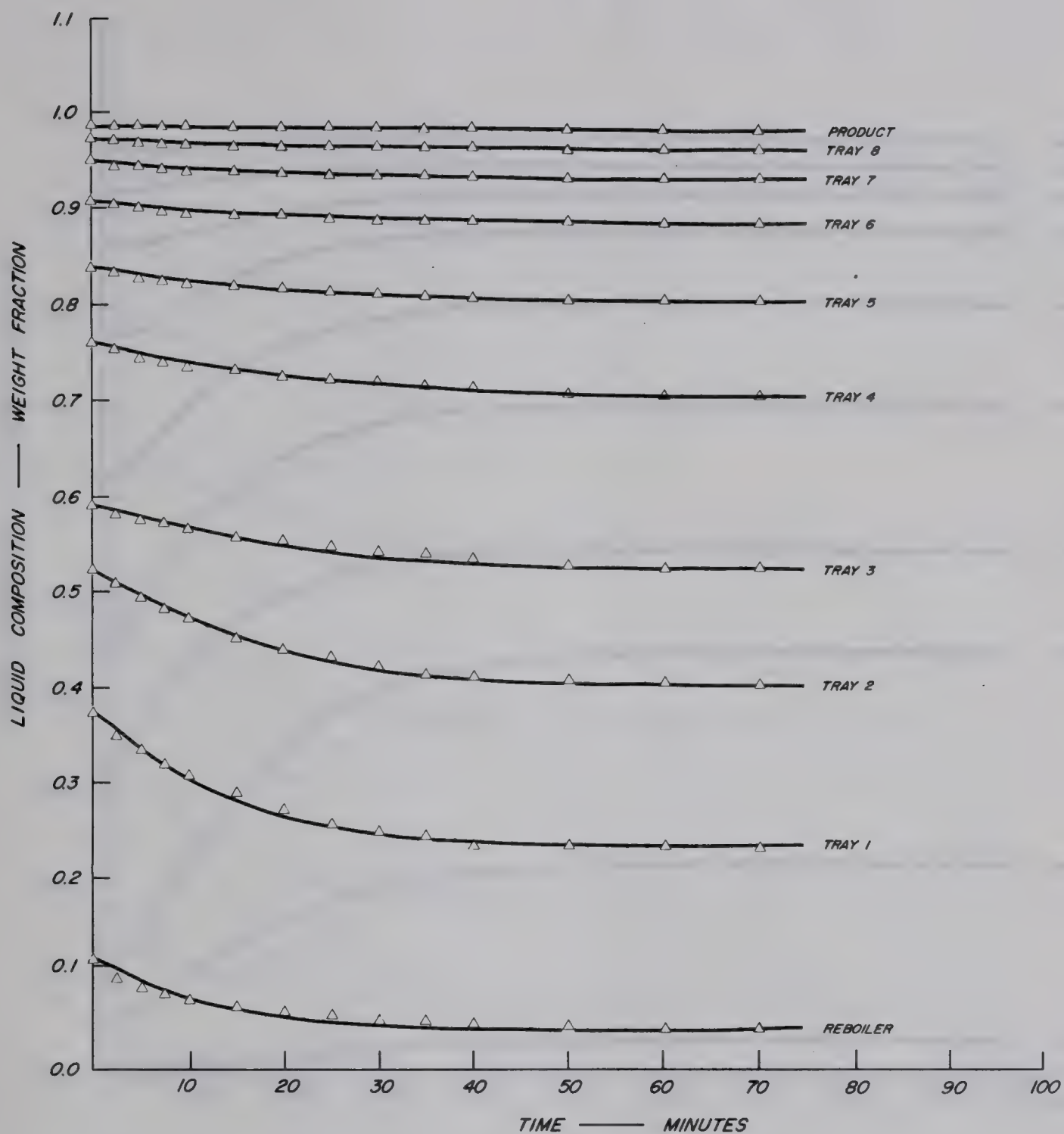


FIGURE 37
OPEN LOOP TRANSIENT RESPONSE
STEP INCREASE IN STEAM FLOW RATE

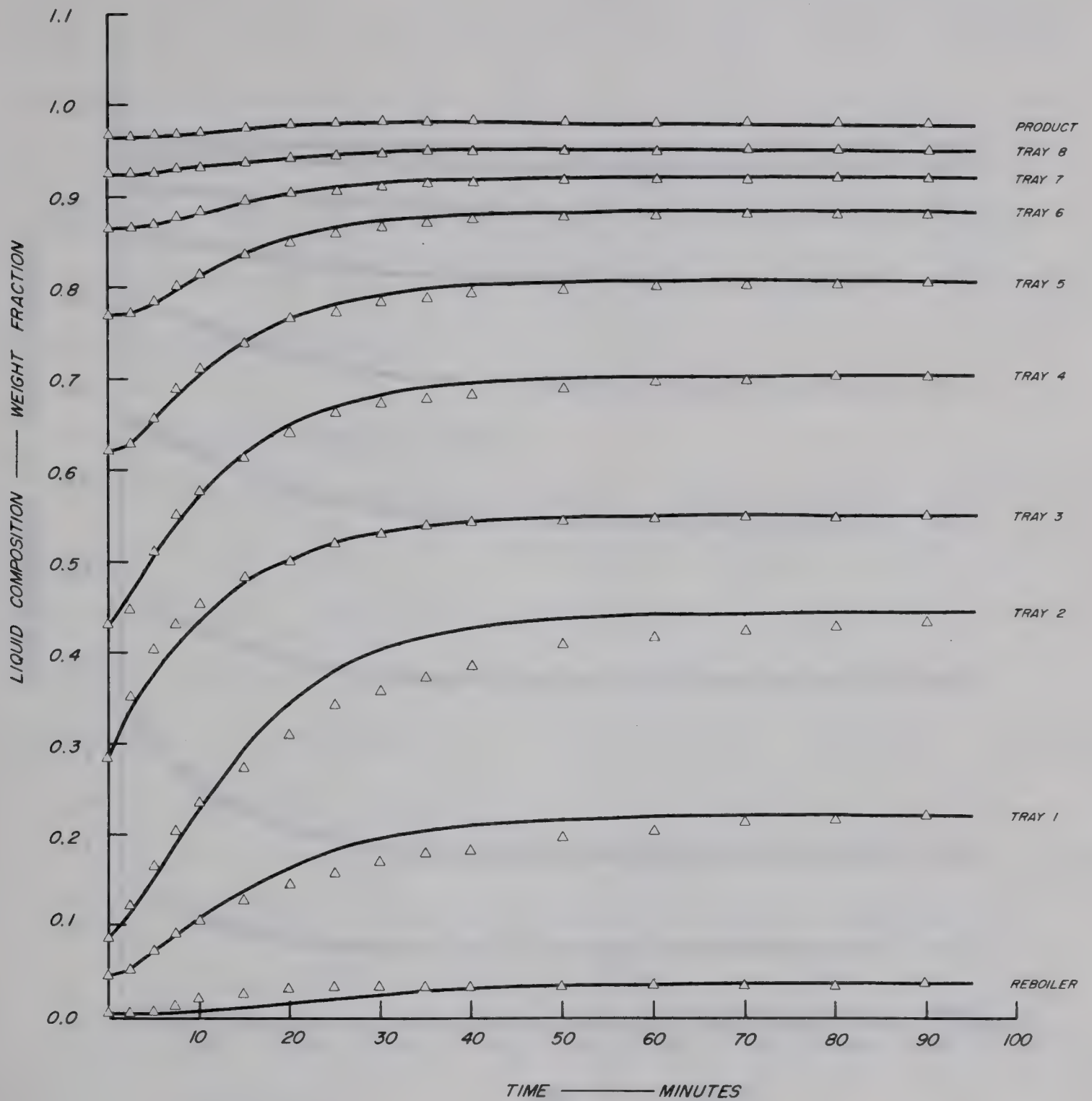


FIGURE 38
OPEN LOOP TRANSIENT RESPONSE
STEP INCREASE IN FEED COMPOSITION

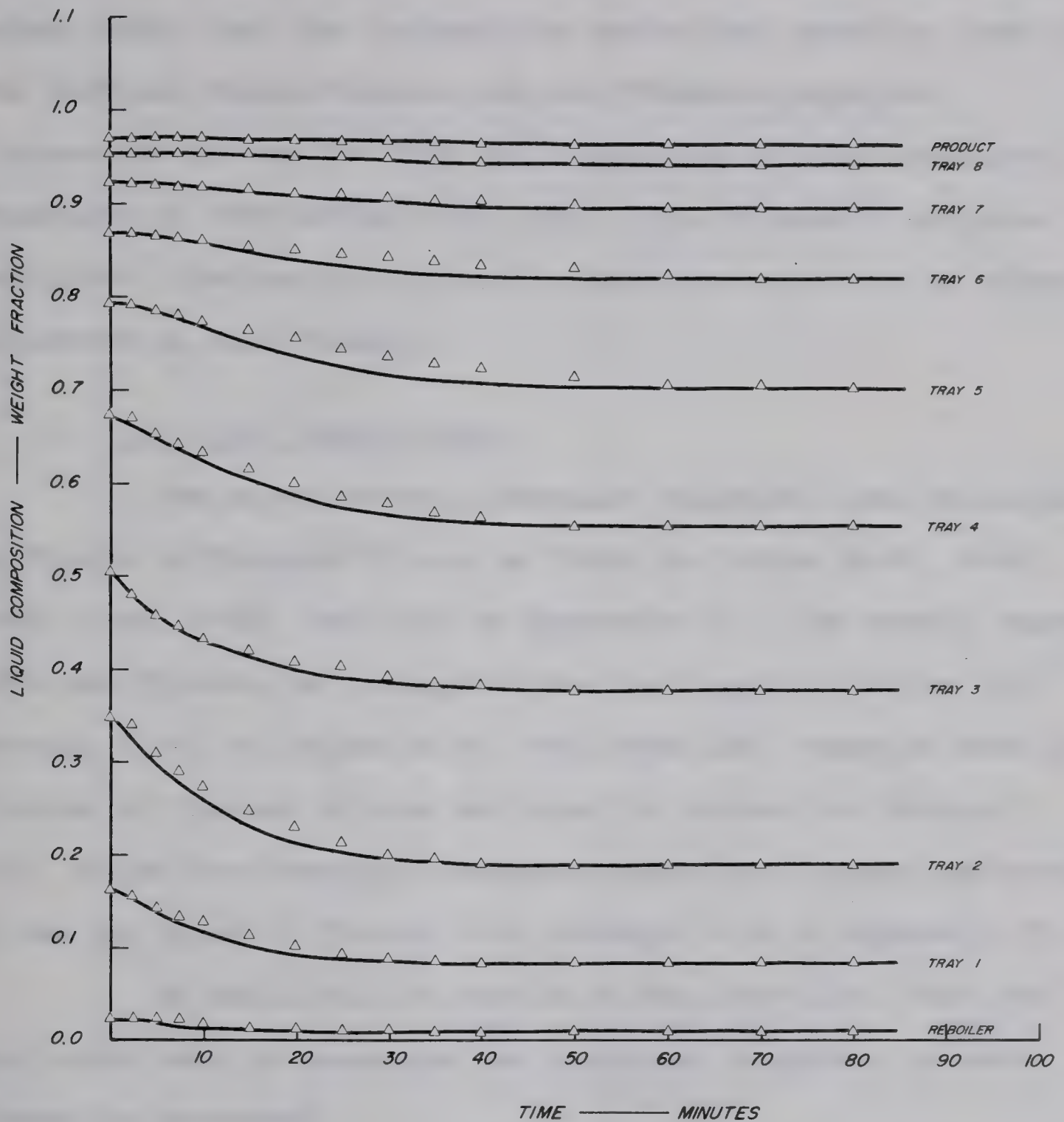


FIGURE 39
OPEN LOOP TRANSIENT RESPONSE
STEP DECREASE IN FEED COMPOSITION

Figures 46 through 51 show the comparison of transient responses data when the composition controller equation used in the Unsteady State Program was the "Foxboro Equation". Figures 52, 53 and 54 show the comparison of the transient responses of the reflux flow rate. The transient response resulting from the use of each controller equation is clearly indicated on each figure.

1. Solution Compositions

The experimental transient response data presented on Figure 40 through 51 can be found in Tables D-36, D-39, D-42, D-45, D-48, and D-51 of Appendix IV. The steady state data for Figures 40 through 51 can be found in Tables S-9 through S-14, of Appendix V. The transient response data for Figures 40 through 45 can be found in Tables U-9 through U-14, while the transient response data for Figures 46 through 51 can be found in Tables U-15 through U-20 of Appendix VI.

As explained in part A of this section, only the step size used to generate the transient response of each figure is presented.

Figures 40 and 46 show the comparison between the experimental and transient response when the feed flow rate was stepped from 150.5 to 132.2 lbm/hr. Figures 41 and 47 show the comparison between experimental and transient response when the feed flow rate was stepped from 132.2 to 150.5 lbm/hr.

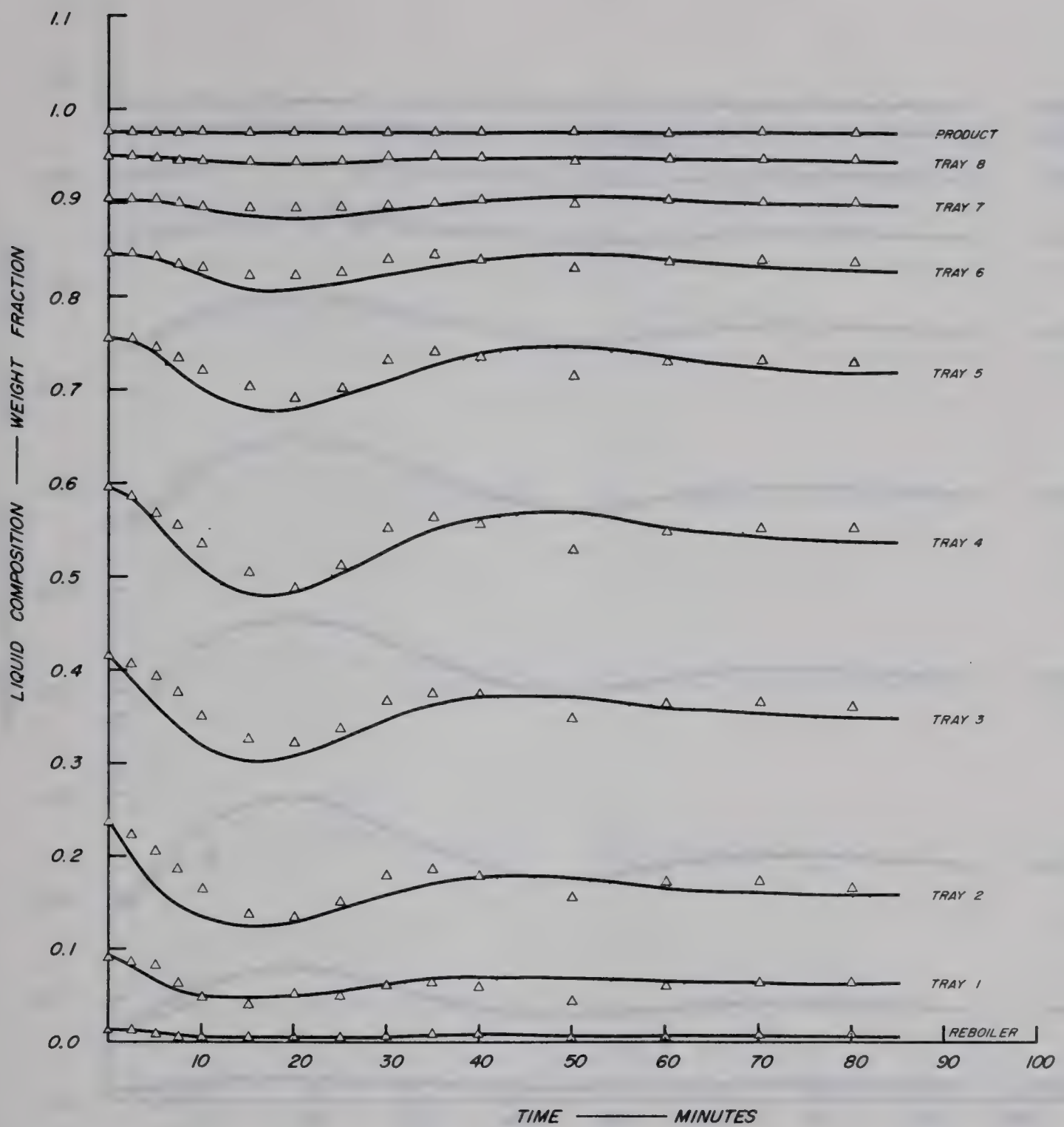


FIGURE 40
CLOSED LOOP TRANSIENT RESPONSE
STEP INCREASE IN FEED FLOW RATE
YOUNG EQUATION

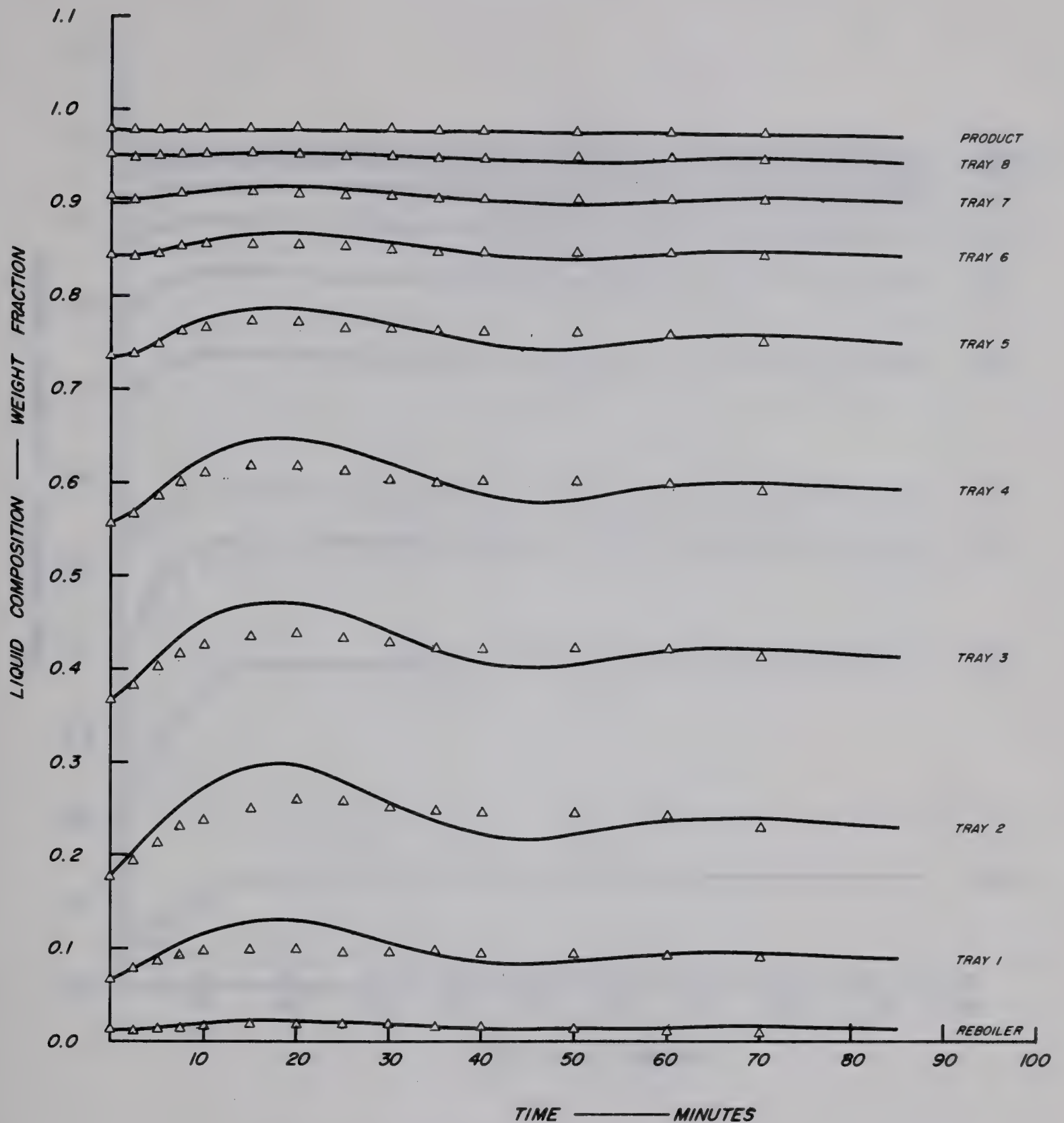


FIGURE 41
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN FEED FLOW RATE
YOUNG EQUATION

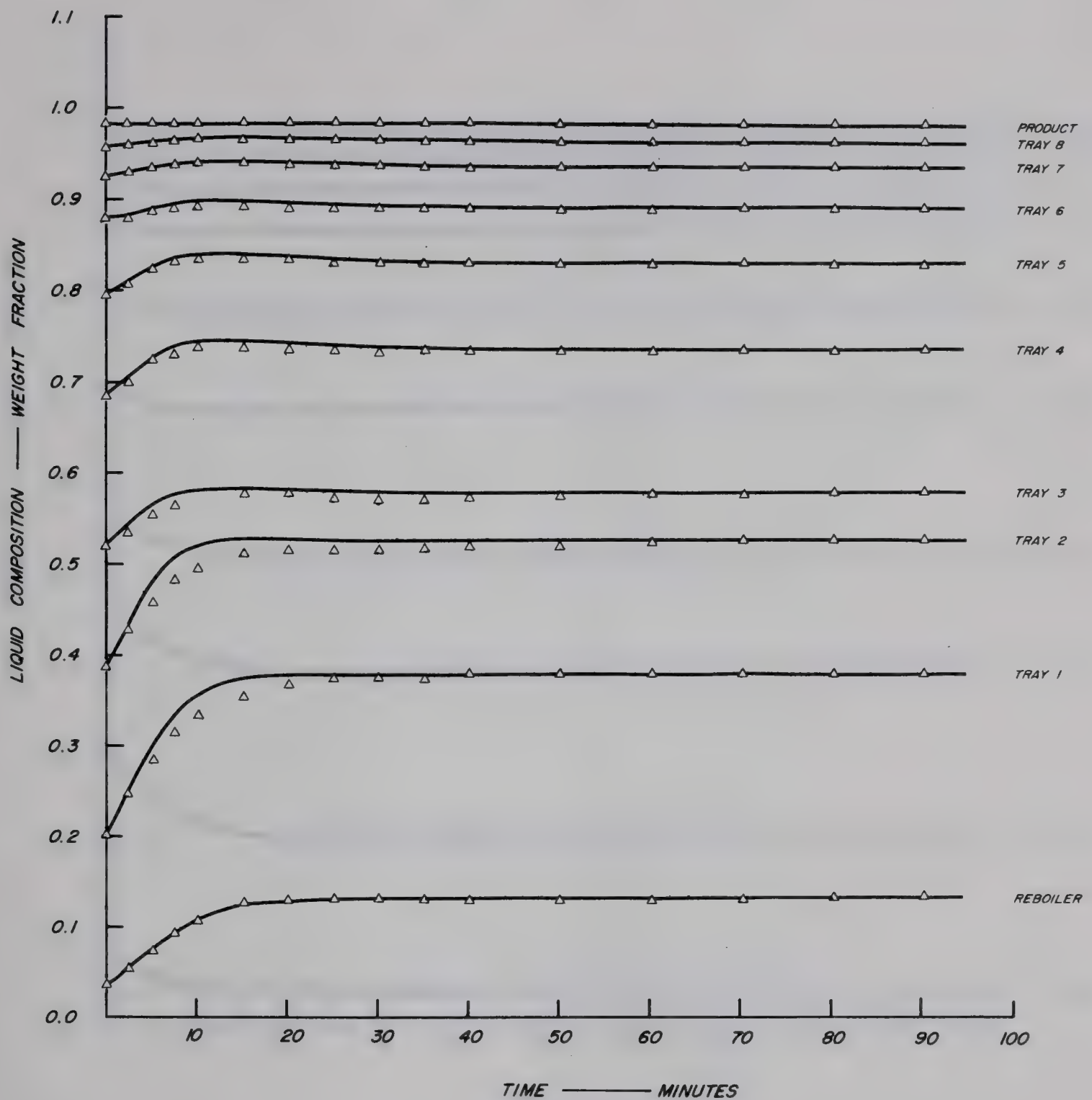


FIGURE 42
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN STEAM FLOW RATE
YOUNG EQUATION

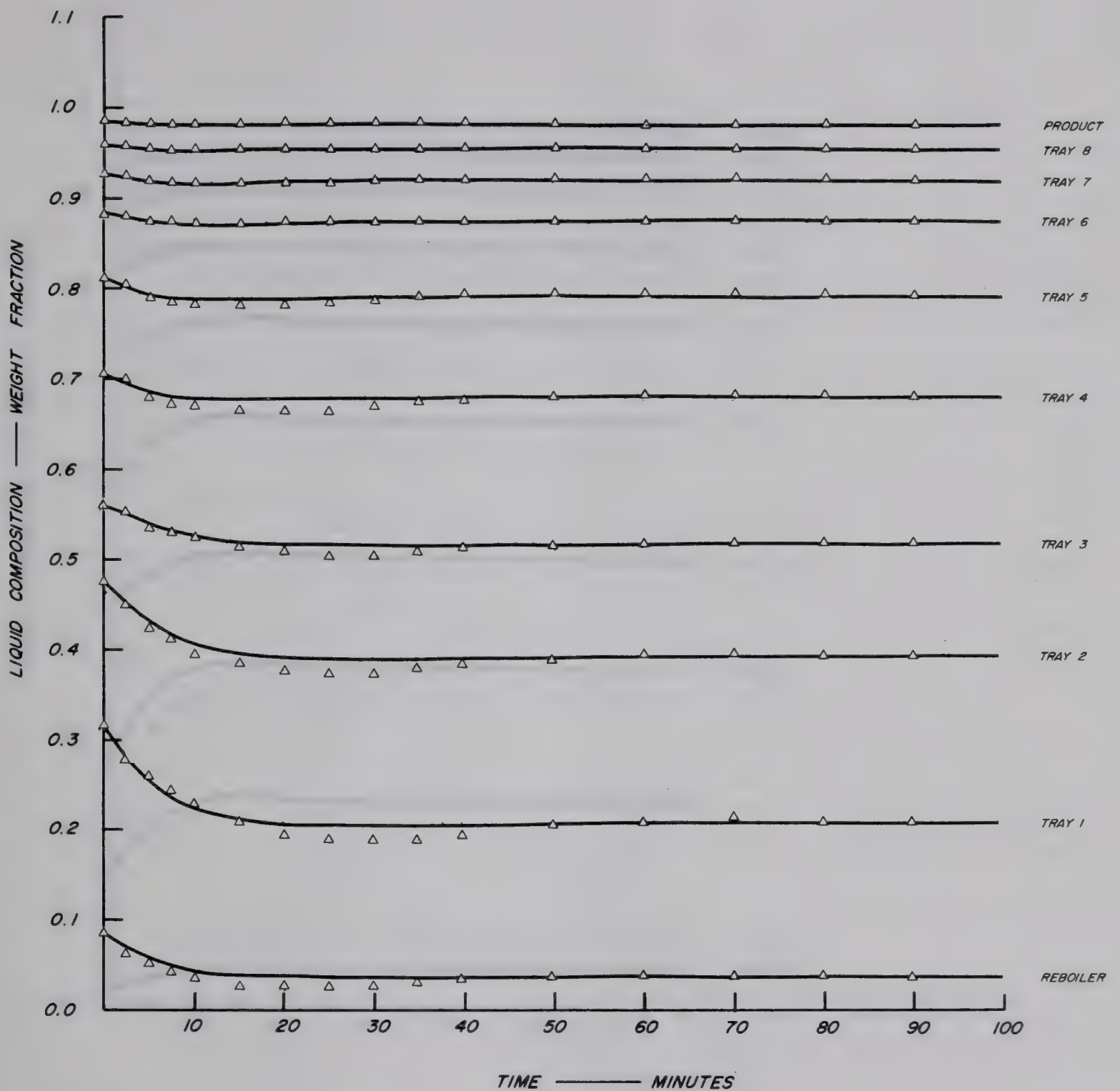


FIGURE 43
CLOSED LOOP TRANSIENT RESPONSE
STEP INCREASE IN STEAM FLOW RATE
YOUNG EQUATION

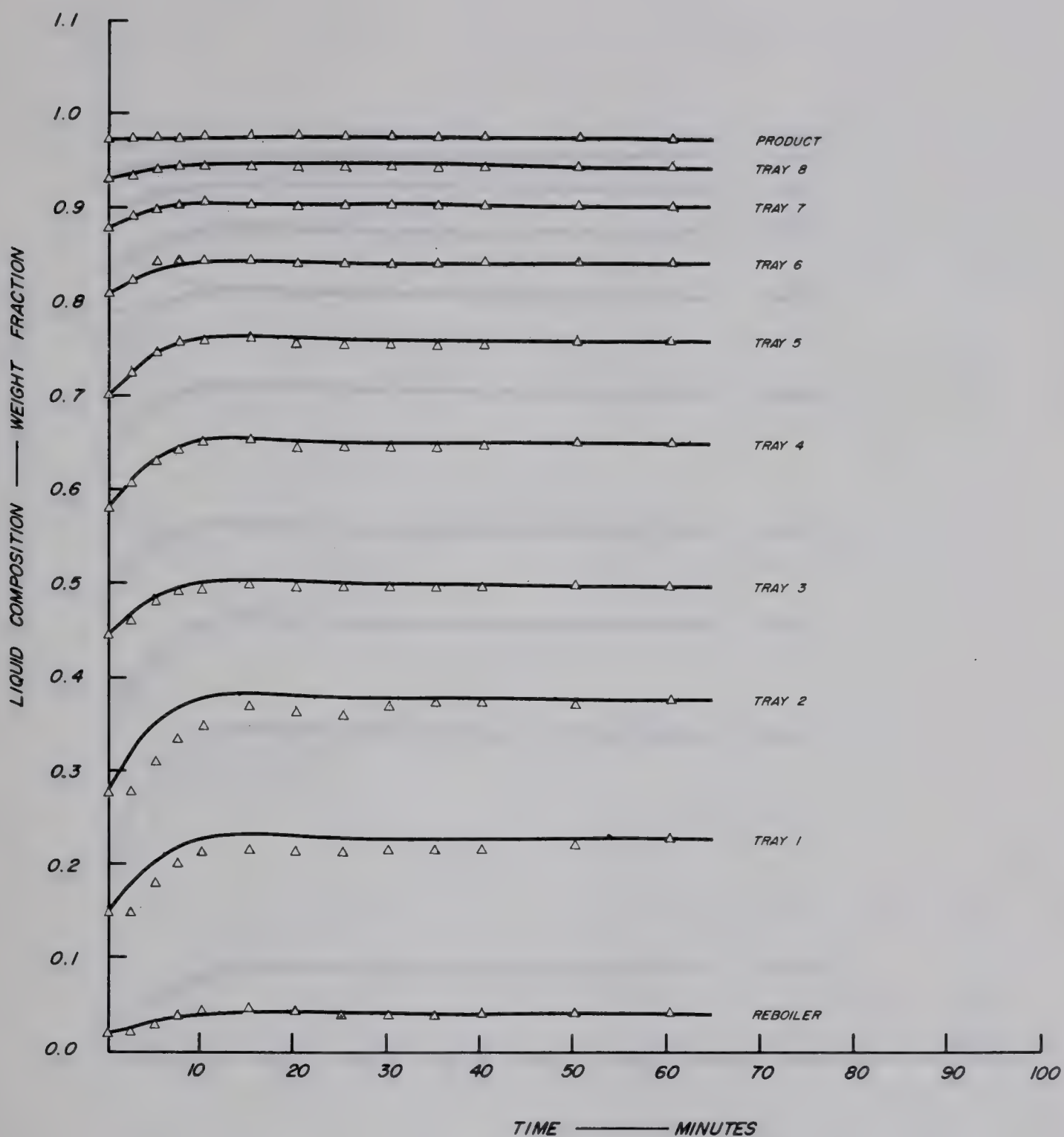


FIGURE 44
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN COMPOSITION CONTROLLER
SET POINT
YOUNG EQUATION

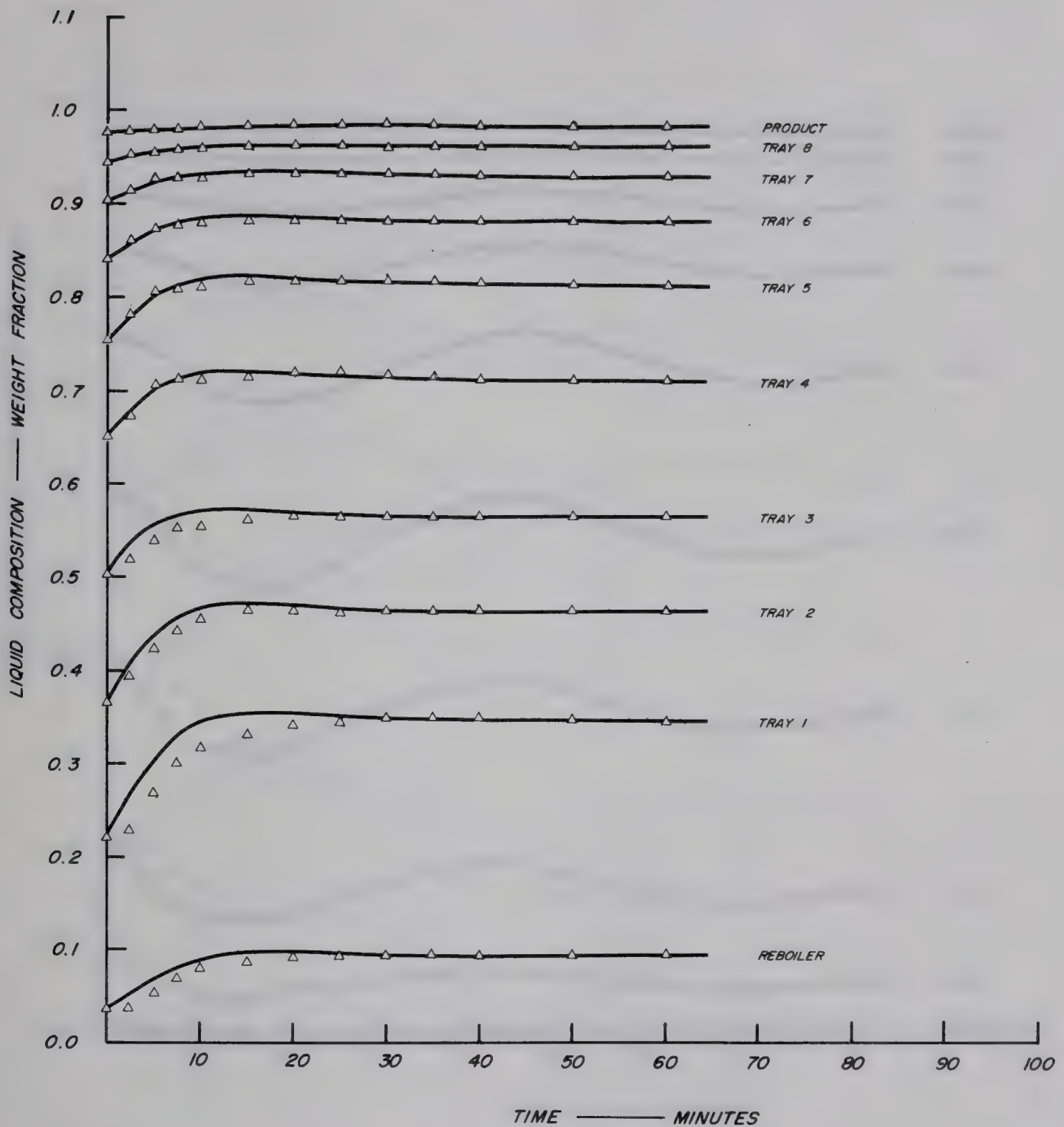


FIGURE 45
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN THE COMPOSITION CONTROLLER
SET POINT
YOUNG EQUATION

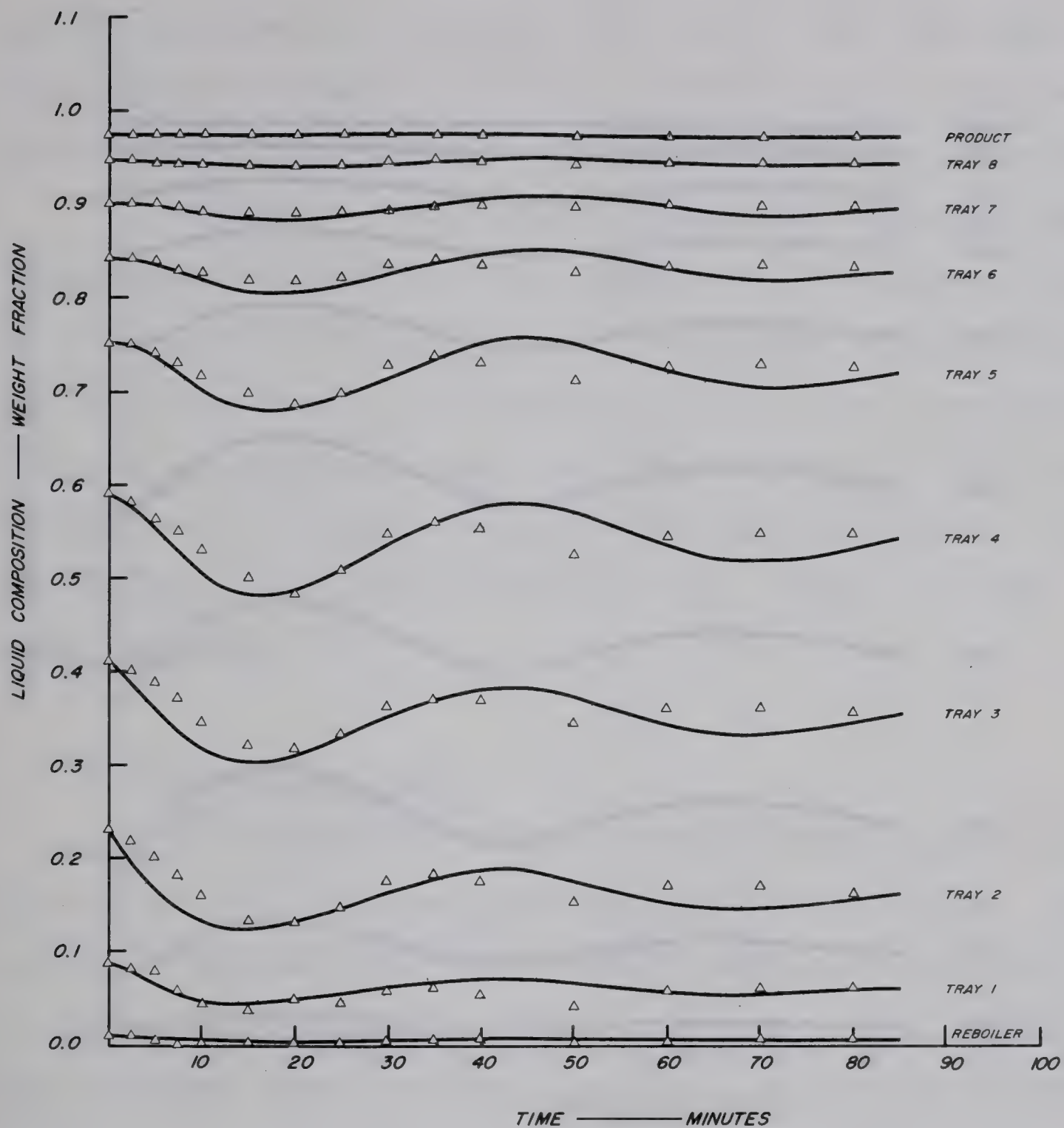


FIGURE 46
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN FEED FLOW RATE
FOXBORO EQUATION

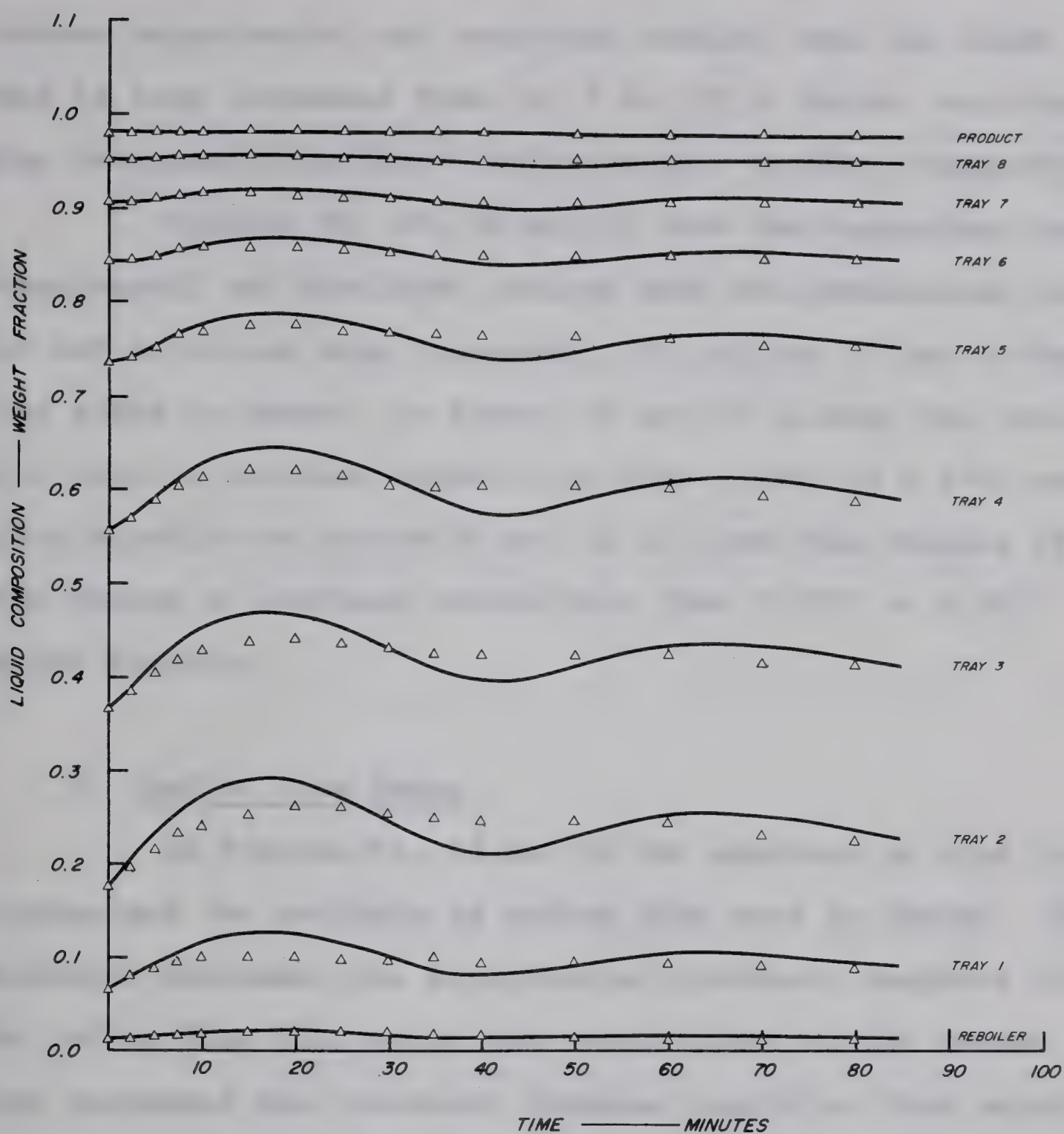


FIGURE 47
CLOSED LOOP TRANSIENT RESPONSE
STEP INCREASE IN FEED FLOW RATE
FOXBORO EQUATION

Figures 42, 48 and 43, 49 show the comparison between experimental and predicted results when the steam flow rate is step increased from 101.3 to 109.9 lbm/hr. and then step decreased from 109.9 lbm/hr to 96.7 lbm/hr., respectively.

Figures 44, 45, 50 and 51 show the comparison between experimental and predicted results when the composition controller set point was step increased. The effect of two different step sizes is shown. On Figure 44 and 50 is shown the results of a step in overhead composition from 0.9707 to 0.9747 weight fraction while on Figure 45 and 51 is shown the results of a step change in overhead composition from 0.9757 to 0.9811 weight fraction.

2. Reflux Flow Rates

On Figures 52, 53 and 54 the abscissa is time in minutes and the ordinate is reflux flow rate in lbm/hr. The triangles represent the experimental transient response of the reflux flow rate while the broken line and the dotted line represent the transient response resulting from using the "Young Equation" and the "Foxboro Equation", respectively.

The experimental reflux flow rate transient response data are presented in Tables VII-1, VII-2, and VII-3 of Appendix VII. The steady state data can be found in Table S-9 through S-14 of Appendix V and the predicted transient response data can be found in Tables U-9 through U-20 of Appendix VI.

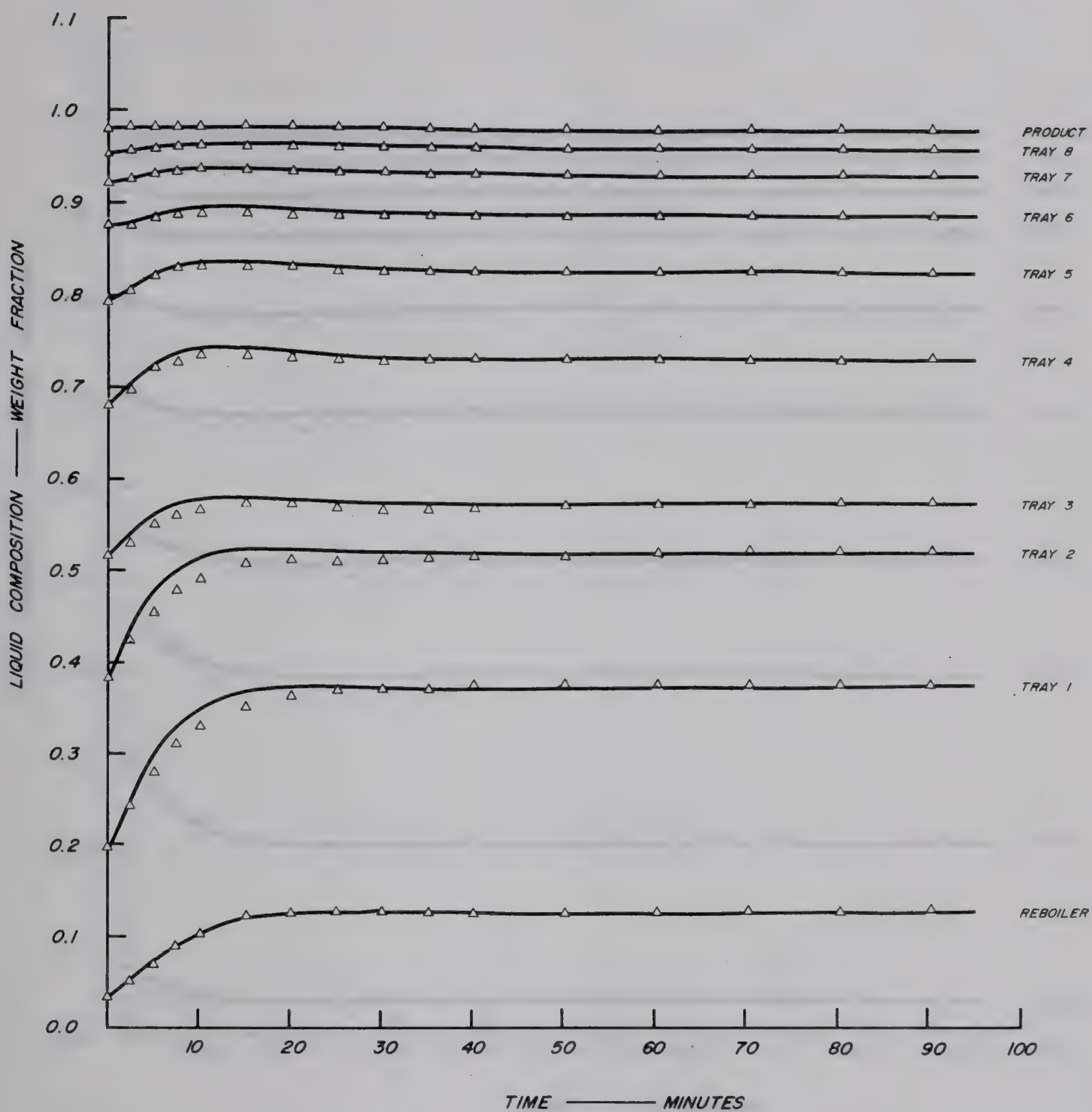


FIGURE 48
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN STEAM FLOW RATE
FOXBORO EQUATION

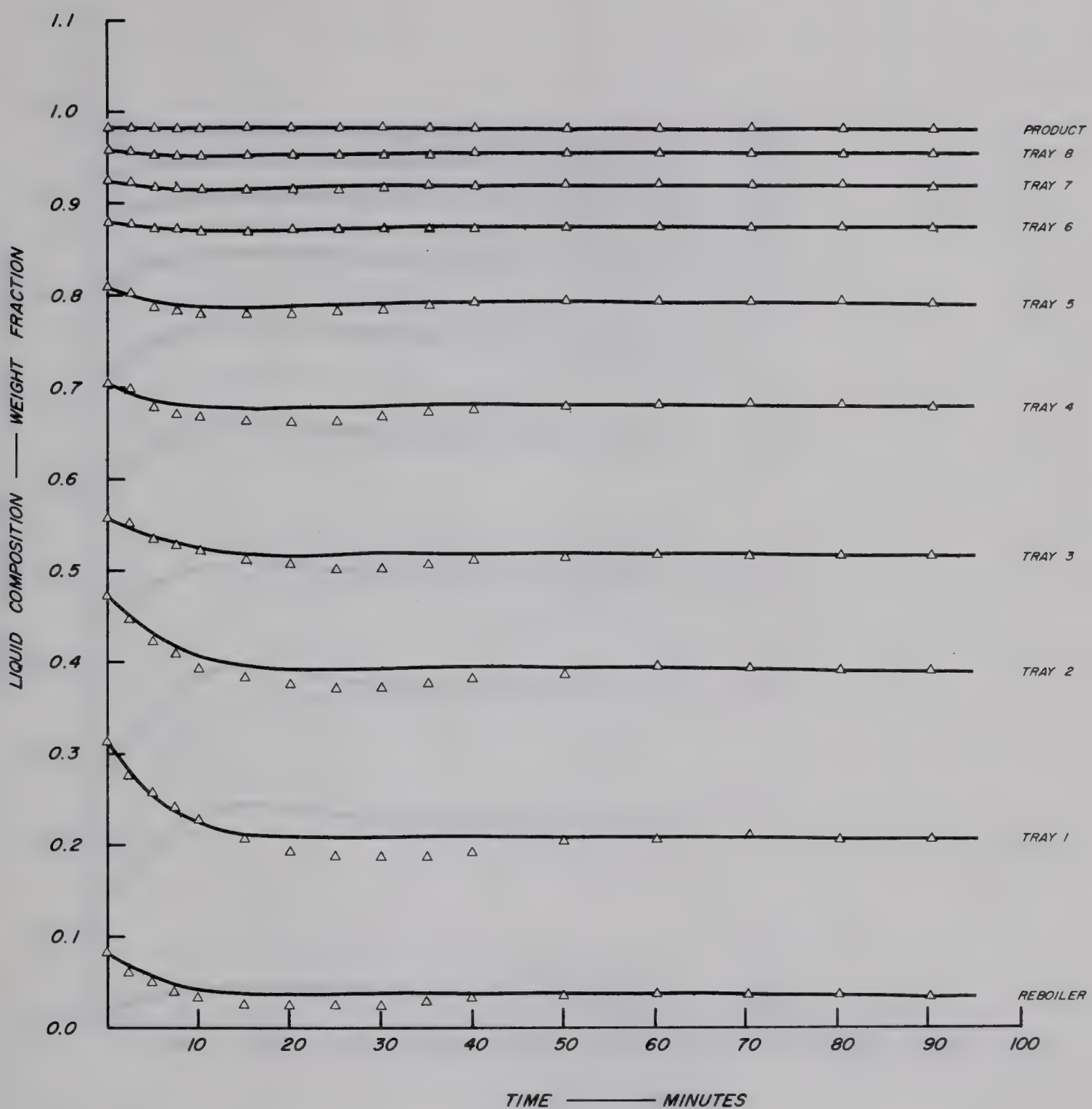


FIGURE 49
CLOSED LOOP TRANSIENT RESPONSE
STEP INCREASE IN STEAM FLOW RATE
FOXBORO EQUATION

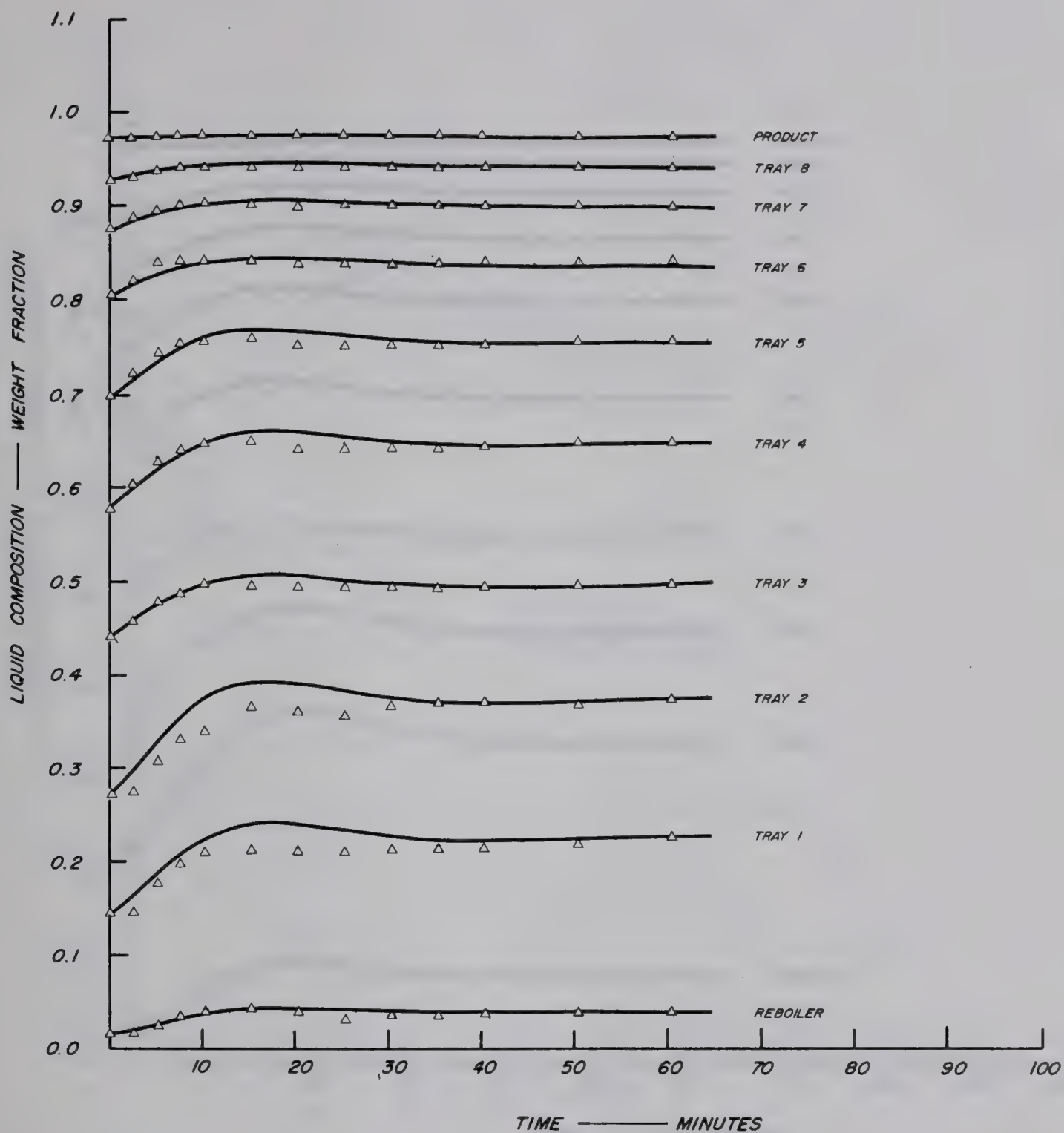


FIGURE 50
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN COMPOSITION CONTROLLER
SET POINT
FOXBORO EQUATION

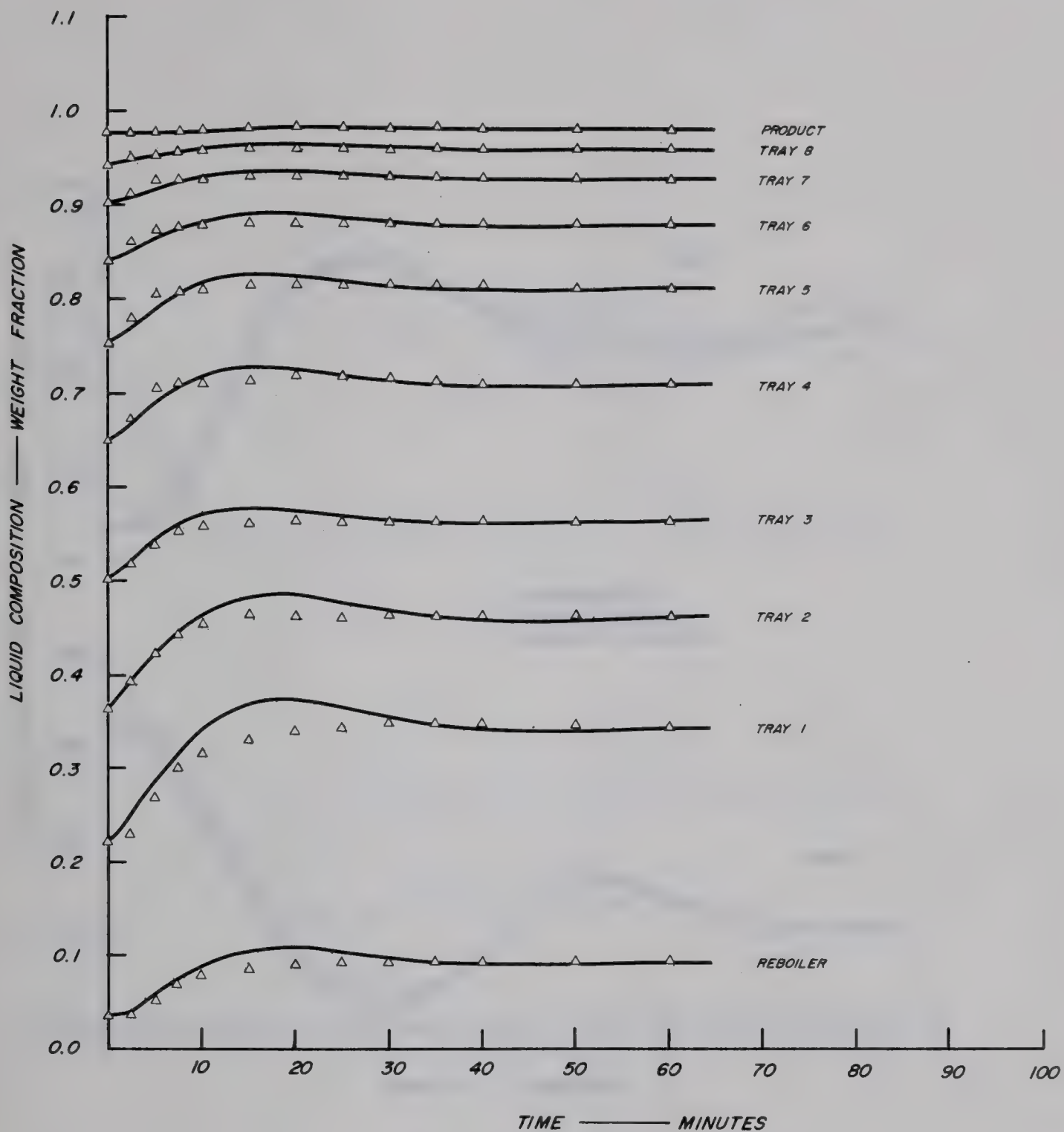


FIGURE 51
CLOSED LOOP TRANSIENT RESPONSE
STEP DECREASE IN COMPOSITION CONTROLLER
SET POINT
FOXBORO EQUATION

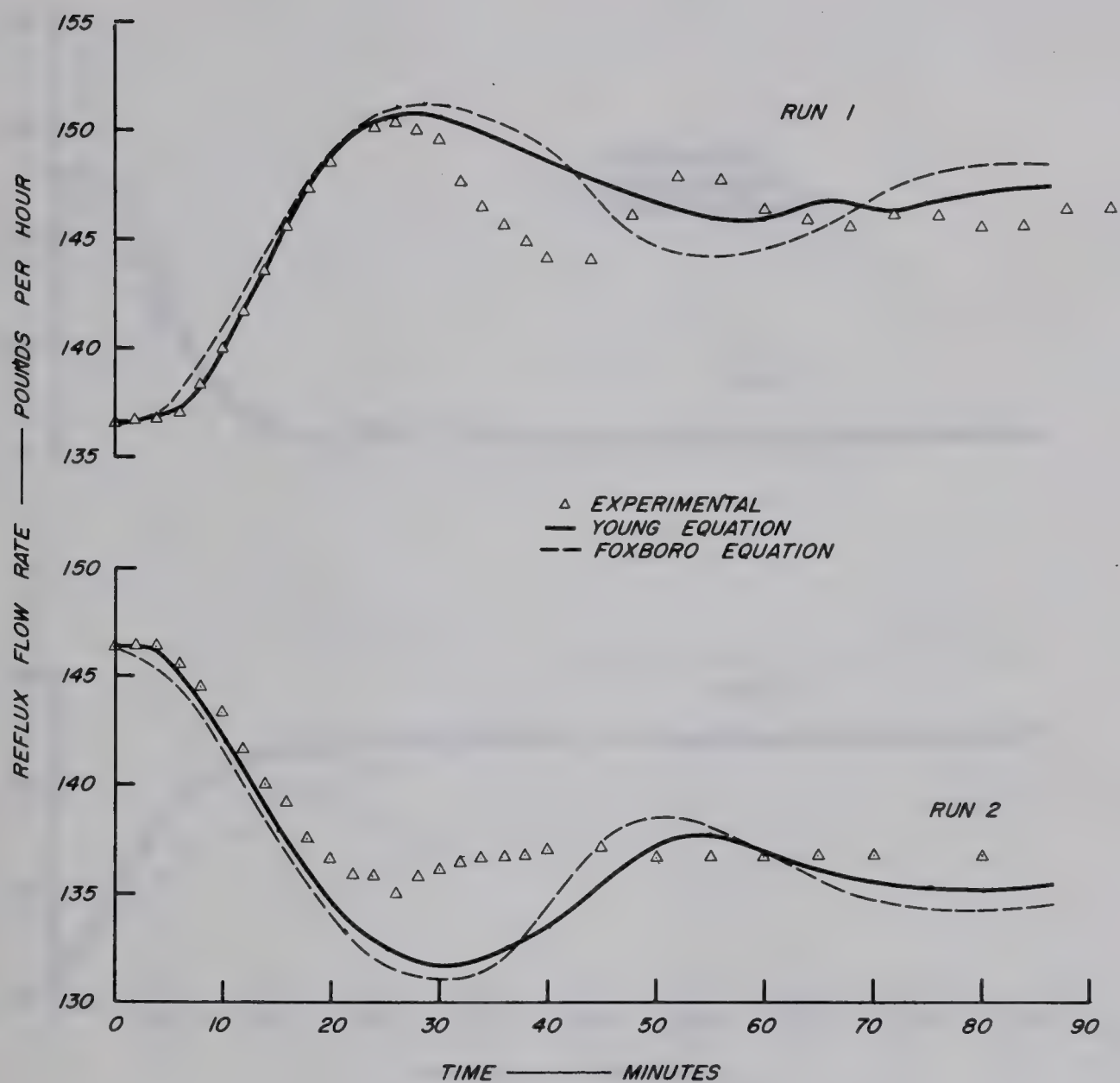


FIGURE 52
CLOSED LOOP TRANSIENT RESPONSE
OF THE REFLUX FLOW RATE
STEPS IN FEED FLOW RATE

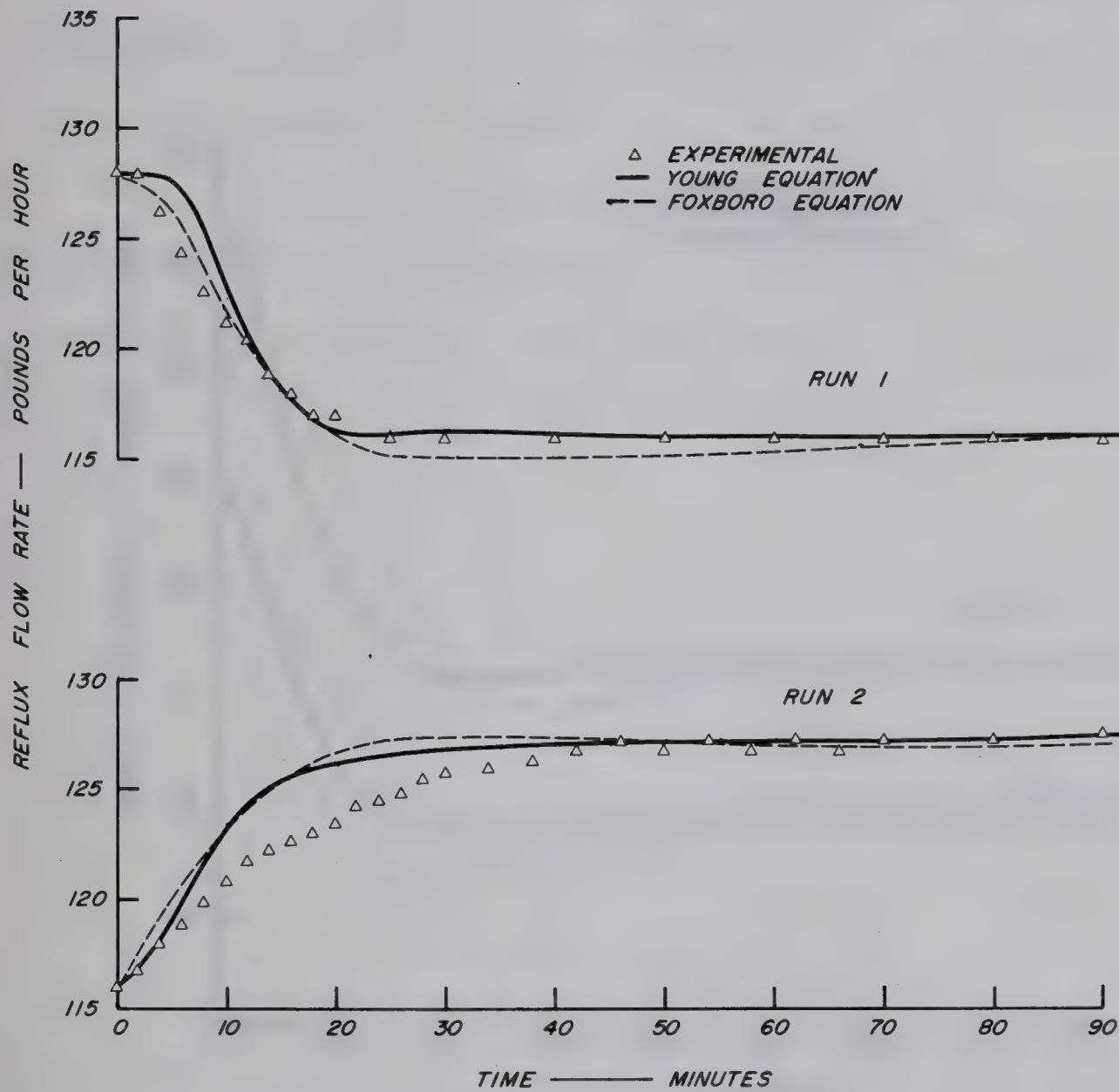


FIGURE 53
CLOSED LOOP TRANSIENT RESPONSE
OF THE REFLUX FLOW RATE
STEPS IN STEAM FLOW RATE

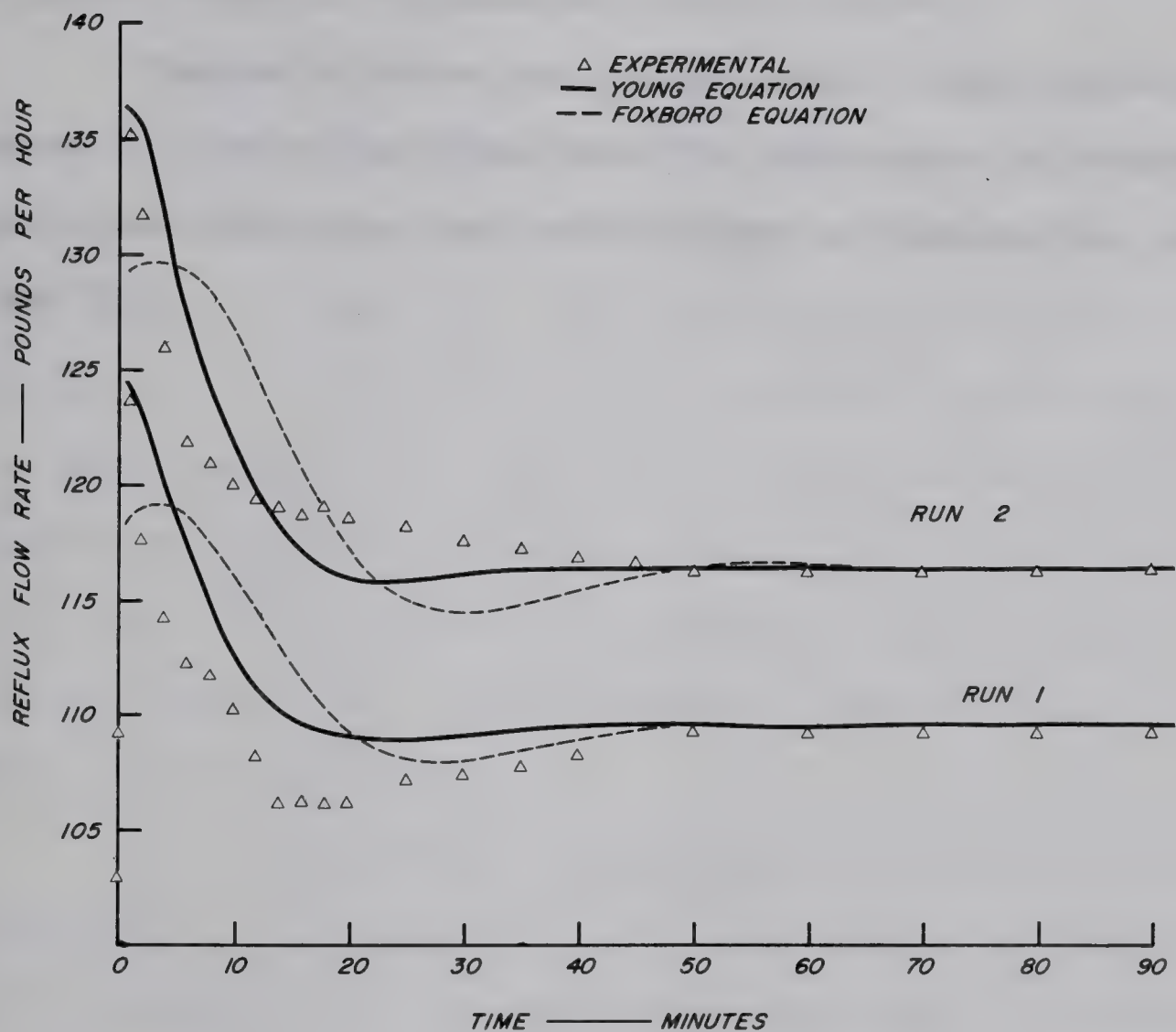


FIGURE 54
CLOSED LOOP TRANSIENT RESPONSE
OF THE REFLUX FLOW RATE
STEPS IN COMPOSITION CONTROLLER SET POINT

Figure 52 shows the comparison of the transient response of the reflux flow rates for the steps in feed flow rate shown in Figures 40, 41, 46 and 47.

Figure 53 shows the comparison of the transient response of the reflux flows rates for the steps in steam flow rates shown in Figures 42, 43, 48 and 49.

Figure 54 shows the comparison of the transient response of the reflux flow rate for the steps in overhead composition controller set point shown in Figures 44, 45, 50, and 51.

VIII. DISCUSSION OF RESULTS

Table 3, Part A, Open Loop Cases and Part B, Closed Loop Cases are a summary of the experimental data. This table is intended to give the reader a brief explanation of each run and the location of the data for each run in the Appendix.

Unfortunately, as pointed out by Williams⁽⁷⁾, there is no universally accepted criterion for assessing the quality of the predicted results when compared to the experimental values. Some authors have used the maximum deviation as an indication of the quality of the comparison between predicted and experimental results. In view of the large amount of data available in the present study, it is felt by the author that the use of maximum deviation and the average deviation would give a rather complete assessment of the quality of the simulation.

An examination of Figures 30 through 37, presented in Section VII, indicates that the comparison between experimental and predicted results for the open-loop experiments had, at any point, an average deviation of 1 percent and maximum deviation of 20 percent. Although this maximum deviation is rather large, the average deviation is exceedingly small, indicating that from an overall point of view the simulation at least for the open loop cases, is very good.

TABLE 3 SUMMARY OF EXPERIMENTAL DATA

A) OPEN LOOP CASES

TYPE OF STEP	FLOW RATES			FEED COMPOSITION	DATA LOCATION				FIGURE NO.
	FEED	STEAM	REFLUX		IV-RAW DATA	V-STEADY STATE	VI-UNSTEADY STATE		
Feed Flow Rate	132.3 150.5	115.9	135.1	0.5060	D-12	S-1	U-1	32	
Feed Flow Rate	122.0 101.5	89.15	99.4	0.5151	D-15	S-2	U-2	33	
Reflux Flow Rate	150.3	114.2	125.2 134.1	0.5133	D-18	S-3	U-3	34	
Reflux Flow Rate	150.3	114.2	135.3 125.2	0.5133	D-21	S-4	U-4	35	
Steam Flow Rate	149.4	115.5 107.6	136.6	0.5117	D-24	S-5	U-5	36	
Steam Flow Rate	149.4	107.5 114.2	136.6	0.5117	D-27	S-6	U-6	37	
Feed Composition	150.3	117.7	136.8	0.4584 0.5599	D-30	S-7	U-7	38	
Feed Composition	150.2	117.0	136.7	0.5383 0.4794	D-33	S-8	U-8	39	

TABLE 3 (CONTINUED)

B) CLOSED LOOP CASES

TYPE OF STEP	FLOW RATES			FEED COMPOSITION	DATA LOCATION				FIGURE NO.
	FEED	STEAM	REFLUX		IV-RAW DATA	V-STEADY STATE	VI-UNSTEADY STATE	APPENDIX NO. AND TITLE	
Feed Flow Rate	150.5 132.3	116.5	136.7	0.5060	D-36	S-9	"Young" U-9 "Foxboro"U-15	40 46	
Feed Flow Rate	132.3 150.5	118.5	146.4	0.5060	D-39	S-10	U-10 U-16	41 47	
Steam Flow Rate	150.3	109.9 96.7	128.0	0.5156	D-42	S-11	U-11 U-17	42 48	
Steam Flow Rate	150.3	101.3 109.9	116.0	0.5156	D-45	S-12	U-12 U-18	43 49	
Comp. Controller Point	150.0	101.5	103.0 109.3	0.5156	D-48	S-13	U-13 U-19	44 50	
Comp. Controller Point	150.0	101.5	109.3 116.2	0.5156	D-51	S-14	U-14 U-20	45 51	

All Flow Rates are in lbm/hr.

All Compositions are in Weight Percent.

The experimental and predicted transient responses, Figures 30 through 37, indicate that the largest deviation occurs during the interval from twenty-five to forty minutes. This is not surprising, since in the formulation of the model, the predicted and experimental results are forced to agree at the beginning and at the end of a run.

An examination of Figures 32 through 35, which are the transient response for steps in feed flow rate and steam flow rate, shows the existence of high order inflections. From the comparison on Figures 32 through 35, it can be seen that the model does not predict these high order inflections. As the high order inflections appear only in the cases of a step change in liquid flow rate within the column, the inclusion of the effect of liquid flow on efficiency and in tray solution hold-up equation might improve the prediction.

Another observation which can be made from Figures 30 to 37 is that for the cases in which the composition was increasing on the trays, the comparison between the experimental and predicted transient response was closer than when the tray compositions were decreasing. This discrepancy can be attributed to an inadequacy in the mathematical model used to predict the theoretical transient response.

Previous workers had not recorded the dynamics of all the trays, reboiler and condenser. As a result, they were not able to make a statement as to the sensitivity of

the location, within the column, of the largest deviation between experimental and predicted results. From Figures 30 through 37 it can be seen that the largest deviation between experimental and predicted results occurred on the tray which underwent the largest change in liquid composition. The tray having the largest change in composition was affected to the largest extent by the non-linearities of the system.

Due to the way in which the mathematical model was formulated, the major variables which affected the quality of the simulation were the hold-up of the solution on the tray and the tray efficiencies. The model assumed that the holdup of solution could be represented by equation (14) which is

$$W = VP \cdot W(X) \quad (14)$$

Possibly a more complete relationship, such as

$$W = VP \cdot DEN(X) + F(L,V) \quad (41)$$

where $F(L,V)$ is some function of the liquid and vapor flow rates to and from the tray, would provide smaller discrepancies between the predicted and experimental results.

As can be seen from Tables S-1 to S-9, Appendix V, the Murphree Liquid Efficiencies varied from about forty percent to over one hundred percent. Two of the major reasons for these wide fluctuations are; errors in the original raw data and the computational problem which develops when taking the ratio of differences of large numbers which are nearly equal.

Originally it was felt that one of the existing efficiency correlations⁽⁵³⁾ could be used to predict or correlate the efficiencies of the trays. The particular correlation was selected from those available, primarily because of its simplicity. The use of a more complex correlation and a statistical approach would probably yield better results. However, as explained previously, no success was achieved with this approach. Thus, to ensure that any run would agree at the steady state points, the Murphree Liquid Efficiencies were calculated at the beginning and end of the run and a straight line interpolation was used for each tray and reboiler.

In the closed loop experiments, two equations for the overhead composition controller were used in determining the predicted transient response data. The comparison between predicted and experimental results, when the "Young Equation" was used, Figures 40 through 45, showed an average deviation of 2.5 percent and a maximum deviation of 40 percent. For the closed loop experiments, when the "Foxboro Equation" was used, Figure 46 through 51, the comparison between predicted and experimental results showed an average deviation of 2.7 percent, and a maximum deviation of 28 percent. From the above results it is reasonable to conclude that neither controller equation is entirely satisfactory.

Considering Figures 40 through 45 individually, it can be seen from Figure 40, for a step decrease in feed flow

rate, the predicted transient response is more damped than the experimental transient response. For a step increase in feed flow, Figure 41, the predicted response is more oscillatory than the experimental response. This behavior suggests that certain, as yet unknown, non-linearities present in the column have not been accounted for by the model. This observation is further supported by the fact that the discrepancies between predicted and experimental transient responses in the open loop cases were smaller for increasing tray compositions than for decreasing tray composition.

Figures 42 and 43 show the comparison of the experimental and predicted transient responses for a step decrease and a step increase in steam flow rates, respectively. The agreement between predicted and experimental results is very good. A possible reason might be that for the magnitude of the step in steam flow rate the transient response is highly damped. Therefore, a difference in oscillatory behavior of the experimental and predicted results would be less obvious.

For the cases of the steps in controller set point, two steps of different sizes were considered. From Figures 44 and 45 it can be seen that the predicted transient responses are slightly more oscillatory than the experimental transient responses. Although there was a change in fluid flow rate down the column, since the perturbations were applied at one end of the column, the experimental and predicted

results would indicate that the change in reflux flow rate was not of sufficient magnitude to create oscillatory responses.

An examination of Figure 46 through 51, in which the "Foxboro Equation" was used as the overhead composition controller equation in calculating the predicted transient responses, indicates that the predicted transient response is slightly more oscillatory than the predicted transient responses resulting when the "Young Equation" was used. Suffice it to say that the observations made in the previous paragraphs apply to Figure 46 through 51 respectively.

The comparison of the transient responses of the reflux flow rate, Figure 52 through 54 showed an average deviation of 1.0 percent and 1.5 percent, and a maximum deviation of 3.8 percent and 5.9 percent for the "Young Equation" and "Foxboro Equation", respectively. A closer look at Figure 52 through 54, and in particular Figure 52 shows that when the step size is large enough and an oscillatory response occurs, the predicted and experimental results are out of phase. At first inspection this behavior might be attributed to an inadequacy in the controller equation or uncertainties in the controller settings. However, the controller settings were determined by calibrating the controller. Furthermore, since the two controller equations used in this study gave similar results, it is felt by the author

that an adequate mathematical description of the overhead composition controller was available. Hence, one could only attribute the shift in the predicted transient response to an inadequate model for the distillation column. The model, as explained previously, does not take into direct account in either the tray holdup equation or the tray efficiency equation, the change in liquid flow rate in the column produced by varying the reflux flow rate.

It should be pointed out that from day to day the calibration curves did shift. In spite of much experimentation the reason for this shifting could not be determined. Hence, new calibration curves were determined during each run. This approach also gave a check on the end points and showed the effect of sampling the trays. The sampling of the column solutions slowed the experimental program down considerably, because after sampling there was at least a three-quarter hour wait while the column came to steady-state again.

It was indicated in the literature review that the experimental transient response at any point was predicted to within 13 percent by the model of Gerster et al^(29, 30, 31) and to within 5 percent by the model of Huckaba et al^(34, 35). In the case of Gerster, the work was done with the aim of comparing the experimental results to the solution of perturbation type equations, hence, the step size of the variable to be perturbed was kept to less than 5 percent. Huckaba et al utilized the same basic equations as presented

in this work except that they assumed constant weight of holdup on the column trays and an adiabatic operation. The transient response data presented by Gerster et al and Huckaba et al showed only composition changes of about 10 weight percent on any tray. It was felt that such a small tray composition change would not reflect non-linearities due to system properties such as the vapor-liquid equilibrium relationship and the enthalpy of the liquid versus composition relationship. During the course of this investigation steps sizes as large as 20% (feed flow rate) were studied and resulted in tray composition changes of 30 weight percent.

All the previous workers except Wilkinson and Armstrong⁽²⁷⁾ have used sampling of the trays as a means of determining the transient response. As pointed out by Wilkinson and Armstrong⁽²⁷⁾, the advantages of continuous sampling and recirculation of the liquid back onto the tray for lengthy experiments is that there is no liquid withdrawal and, therefore, no change in the column liquid flow rate. As shown by Figures 26 and 27, the effect of this liquid withdrawal can be very marked, especially on the trays in which the largest separation was occurring.

From the previous paragraphs it is evident that dynamic data are useful as a verification of a mathematical model or for simulation. Hougen⁽⁵⁵⁾ in his article lists a number of areas in which he thinks dynamic information can prove useful. These are

- 1) to yield fundamental data useful in design and equipment scale-up;
- 2) to contribute to the understanding of physical and chemical phenomena; and
- 3) to identify disturbances, diagnose malfunctions, reveal improper processing and supply information for advance control schemes.

IX. CONCLUSIONS

1) A fully controlled eight tray binary distillation column has been built and brought into operation. The original objective of ease in taking dynamic data was achieved by continuously recording the variables of interest. Moreover, depending on the purpose of the experiment, the column control loops were easily arranged into a number of control schemes.

2) The capacitance of the solution was used to determine the composition of the binary system methanol-water. This method offered a feasible means of obtaining transient response data, simultaneously for all the trays, condenser, and reboiler of the distillation column. It eliminated the need for sampling of the column during the transient response.

3) A mathematical model describing the transient behavior of a binary distillation column has been developed. As a result of the assumptions made, the model was considered to be made up of several interacting cells. The equations which describe each section were examined as to their dynamic significance. The differential equations exhibiting a "fast" response were replaced by algebraic steady state equations. The grouping of the remaining differential equations into two sets enabled the solution of the model to be effected in a reasonable computer time.

4) The model was solved on an IBM 7040 computer using "Heun's first method" as the integration routine and the simulated response compared with the experimental data. The model in the open loop cases described very satisfactorily the transient response due to the perturbations used. In the closed loop cases, however, the predictions were not so gratifying. From an overall point of view, it is felt that the model does describe adequately a wide variety of load disturbances, both in the open loop and in the closed loop.

It should be emphasized that the model was validated using only the results from the binary distillation column constructed for this purpose. Hence, strictly speaking, the model can only be considered valid for this particular system. Therefore, before using the model to simulate other distillation columns, the assumptions made in the derivation would have to be examined.

X. RECOMMENDATIONS FOR FUTURE WORK

Having a suitable system for taking dynamic data, a number of further experiments are possible. These might include:

- 1) The determination of the transient response due to a sequence of steps or a simultaneous step in two or more variables.
- 2) The transient response due to the switching of the feed tray location.
- 3) The dynamic response resulting when other types of plates or other liquid systems are used.
- 4) The testing of the distillation system by use of other forcing techniques such as pulse or frequency, and the comparison of these results with theory and with the results determined through the use of each forcing technique.

Although the use of capacitance of the solution to determine the composition of methanol-water solutions proved satisfactory, two aspects which deserve further study are

- 1) the reasons for the zero shifting of the recorder pen for high water concentrations; and
- 2) the elimination of the tray circulation system by the installation of the probes on the trays. Such a composition measuring system would not disturb, to any degree, the operation of the column.

- 3) the development of a suitable describing equation for the Foxboro Model "40" with Hyper-Reset controller.

Since a part of this study was concerned only with the measurement of the transient response of the column at specific overhead composition controller settings, it is recommended that a further study be made on the column transient response at different controller settings. Such a study of column control characteristic should also include further work on the control of overhead composition with reflux flow, or possibly steam flow, or a combination of the two with an "eye" to determining the optimum controller settings.

The use of an on-line computer is recommended. An on-line computer can be substituted for the conventional control equipment, increase the frequency of data logging and facilitate the processing of the large amount of experimental data. Moreover the on-line computer could be used in a study of non-linear control techniques and in the development of an optimization system for the column.

XI. NOMENCLATURE

A	constants used to evaluate the enthalpy
B	of the reboiler steam condensate, BTU/lbm, BTU/lbm ^{°F}
ARD	constants used to calculate the reflux flow
BRD	rate, lbm/hr.
D	overhead product flow rate, lbm/hr
E	error signal to composition controller, chart %
EF	error signal to reflux flow controller
EM	Murphree Liquid tray efficiency, %
ER	error signal to the overhead composition controller
EX	error, weight fraction
F	feed flow rate, lbm/hr.
Geo	geometer factor
GC	composition controller transfer function
GD	differential pressure transmitter transfer function
GF	reflux flow controller transfer function
GFE	calibration curve for the reflux flow rate, R, versus controller chart percent
GP	distillation column transfer function
GV	control valve transfer function
GX	composition to electrical signal convertor (capacitance cell)
H	enthalpy of the vapor streams, BTU/lbm
HSI	enthalpy of the inlet steam to the reboiler, BTU/lbm
KP	composition controller gain
L	liquid flow rate, lbm/hr.

PC	composition controller output, chart %
PCC	output signal of composition controller
PCS	initial output of composition controller, chart %
Q	heat load, BTU/hr.
QHL	heat loss, from the column, BTU/hr.
QL	heat loss, BTU/hr.
QT	theoretical heat load, BTU/hr.
R	reflux flow rate, lbm/hr.
S	side stream, lbm/hr.
SI	inlet steam flow rate to reboiler, lbm/hr.
SLCC	reciprocal of the slope of the composition versus chart percent calibration curve for the overhead product controller, chart %/weight fraction
SO	exit steam condensate flow rate from the reboiler, lbm/hr.
SP	set point of overhead composition controller
SPG	specific gravity of the reflux
T	temperature, °F
Td	derivative time, minutes
Ti	integral time, minutes
UA	product of the overall heat transfer coefficient and the area of the reboiler, BTU/hr. °F.
V	vapor flow rate, lbm/hr.
VP	volume of solution on the tray ft ³
W	weight hold-up of solution on the tray, lbm
X	tray solution composition, weight fraction
XDP	set point of the composition controller, weight fraction
XE	equilibrium liquid composition, weight fraction

XT	condenser liquid composition, weight fraction
Y	composition of vapor off a tray, weight fraction
h	enthalpy of the tray solution, BTU/lbm
t	time, hours

Subscripts

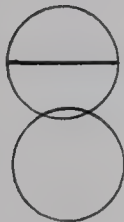
AVE	average
B	bottoms product
C	condenser
D	overhead product
F	feed
n	from tray n
n+1	from tray n+1
n-1	from tray n-1
R	reboiler
S	steam
T	tray

XII. CONTROL DIAGRAM SYMBOLS

1. Instrument Symbols



board mounted instrument with a single function



board mounted instrument with a dual function



board mounted multipoint recorder



field mounted transmitter



manually operated valve



diaphragm motor valve

2. Instrument Piping



instrument airlines



instrument electrical leads

3. Instrument Function Designations

CRC composition recording controller

FR flow recorder

FRC flow recording controller

LLIC	liquid level indicating controller
PIC	pressure indicating controller
PR	pressure recorder
RIC	ratio indicating controller
TRC	temperature recording controller
1,2	pen numbers

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A P P E N D I X I

DERIVATION OF THE EQUATIONS FOR THE
VAPOR AND LIQUID FLOW RATES WITHIN THE COLUMN

The equations for determining the liquid and vapor flow rates within the column are derived in this appendix. The derivation consists of writing the overall mass and enthalpy balances for each tray, and reboiler of the distillation column. For an eight tray distillation column with feed on the fourth tray, the following set of differential equations can be written:

Overall Mass Balance

Enthalpy Balance

Reboiler

$$\frac{dW_1}{dt} = L_2 - V_1 - L_1$$

$$\begin{aligned} \frac{dW_1 h_1}{dt} &= L_2 h_2 + Q_R \\ &- V_1 H_1 - L_1 h_1 \end{aligned}$$

Stripping Section

$$\begin{aligned} \text{Tray 1. } \frac{dW_2}{dt} &= V_1 + L_3 - V_2 \\ &- L_2 \end{aligned}$$

$$\begin{aligned} \frac{dW_2 h_2}{dt} &= V_1 H_1 + L_3 h_3 \\ &- V_2 H_2 - L_2 h_2 \end{aligned}$$

$$\begin{aligned} \text{Tray 2. } \frac{dW_3}{dt} &= V_2 + L_4 - V_3 \\ &- L_3 \end{aligned}$$

$$\begin{aligned} \frac{dW_3 h_3}{dt} &= V_2 H_2 + L_4 h_4 \\ &- V_3 H_3 - L_3 h_3 \end{aligned}$$

$$\begin{aligned} \text{Tray 3. } \frac{dW_4}{dt} &= V_3 + L_5 - V_4 \\ &- L_4 \end{aligned}$$

$$\begin{aligned} \frac{dW_4 h_4}{dt} &= V_3 H_3 + L_5 h_5 \\ &- V_4 H_4 - L_4 h_4 \end{aligned}$$

Feed Tray

$$\begin{aligned} \text{Tray 4.} \quad \frac{dw_5}{dt} &= F + V_4 + L_6 - V_5 - L_5 & \frac{dw_5 h_5}{dt} &= Fh_F + V_4 H_4 + L_6 h_6 - V_5 H_5 - L_5 h_5 \end{aligned}$$

Rectifying Section

$$\begin{aligned} \text{Tray 5.} \quad \frac{dw_6}{dt} &= V_5 + L_7 - V_6 - L_6 & \frac{dw_6 h_6}{dt} &= V_5 H_5 + L_7 h_7 - V_6 H_6 - L_6 h_6 \end{aligned}$$

$$\begin{aligned} \text{Tray 6.} \quad \frac{dw_7}{dt} &= V_6 + L_8 - V_7 - L_7 & \frac{dw_7 h_7}{dt} &= V_6 H_6 + L_8 h_8 - V_7 H_7 - L_7 h_7 \end{aligned}$$

$$\begin{aligned} \text{Tray 7.} \quad \frac{dw_8}{dt} &= V_7 + L_9 - V_8 - L_8 & \frac{dw_8 h_8}{dt} &= V_7 H_7 + L_9 h_9 - V_8 H_8 - L_8 h_8 \end{aligned}$$

$$\begin{aligned} \text{Tray 8.} \quad \frac{dw_9}{dt} &= V_8 + L_{10} - V_9 - L_9 & \frac{dw_9 h_9}{dt} &= V_8 H_8 + L_{10} h_{10} - V_9 H_9 - L_9 h_9 \end{aligned}$$

Given the compositions of the liquid on the individual trays and in the product and bottom streams, the value of the derivatives $\left(\frac{dw_n}{dt}, \frac{dh_n}{dt} \right)$ and the thermodynamic properties can be calculated from equations (4), (5), and (14). The above set of differential equations then becomes a set of eighteen algebraic equations in eighteen unknowns. By combining the overall mass balance

and enthalpy balance for each tray, the liquid flow rate terms are eliminated and the equations for the vapor flow rates are obtained. Thus, the original set of eighteen algebraic equations is reduced to nine equations in nine unknowns. The details of this simplification are as follows:

Eliminating Liquid Flows

$$\begin{aligned} \text{Tray 8. } V_8 H_8 + L_{10} h_{10} - V_9 H_9 - h_9 (V_8 + L_{10} - V_9 - DW_9) \\ - QLP = DW_9 h_9 + h_9 DW_9 \end{aligned}$$

$$\begin{aligned} V_8 (H_8 - h_9) + L_{10} (h_{10} - h_9) - V_9 (H_9 - h_9) \\ - QLP = W_9 Dh_9 \end{aligned}$$

$$\begin{aligned} \text{Tray 7. } V_7 (H_7 - h_8) + L_9 (h_9 - h_8) - V_8 (H_8 - h_8) \\ - QLP = W_8 Dh_8 \end{aligned}$$

$$\begin{aligned} V_7 (H_7 - h_8) + (h_9 - h_8) (V_8 + L_{10} - V_9 - DW_9) \\ - V_8 (H_8 - h_8) - QLP = W_8 Dh_8 \end{aligned}$$

$$\begin{aligned} V_7 (H_7 - h_8) + V_8 (h_9 - h_8) + L_{10} (h_9 - h_8) \\ - V_9 (h_9 - h_8) = W_8 Dh_8 + (h_9 - h_8) DW_9 \end{aligned}$$

$$\begin{aligned} \text{Tray 6. } V_6 (H_6 - h_7) + L_8 (h_8 - h_7) - V_7 (H_8 - h_8) \\ - QLP - W_7 Dh_7 \end{aligned}$$

$$L_8 = V_7 + L_9 - V_8 - DW_8$$

$$L_8 = V_7 + V_8 + L_{10} - V_9 - DW_9 - V_8 - DW_8$$

$$V_6(H_6 - h_7) + V_7(h_8 - H_7) + L_{10}(h_8 - h_7) - V_9(h_8 - h_7) - QLP = W_7 Dh_7 + (h_8 - h_7) \sum_{i=8}^9 DW_i$$

$$\text{Tray 5: } V_5(H_5 - h_6) + L_7(h_7 - h_6) - V_6(H_6 - h_6) - QLP = W_6 Dh_6$$

$$L_7 = V_6 + L_8 - V_7 - DW_7 = V_6 + V_7 + L_{10} - V_9 - DW_{89} - V_7 - DW_7$$

$$L_7 = V_6 + L_{10} - V_9 - DW_{789}$$

$$V_5(H_5 - h_6) + V_6(h_7 - H_6) + L_{10}(h_7 - h_6) - V_9(h_7 - h_6) - QLP = W_6 Dh_6 + (h_7 - h_6) \sum_{i=7}^9 DW_i$$

$$\text{Tray 4: } Fh_F + V_4 H_4 + L_6 h_6 - V_5 H_5 - h_5(F + V_4 + L_6 - V_5 - DW_5) = QLP = DW h_5$$

$$V_4(H_4 - h_5) + L_6(h_6 - h_5) - V_5(H_5 - h_6) = W_5 Dh_5 - F(h_4 - h_5)$$

$$L_6 = V_5 + L_7 - V_6 - DW_6 = V_5 + V_6 + L_{10} - V_9 - DW_{789} - V_8 - DW_6$$

$$L_6 = V_5 + L_{10} - V_9 - DW_{6789}$$

$$V_4(H_4 - h_5) + h_6 - H_5) V_5 + L_{10}(h_6 - h_5) - V_9(h_6 - h_5) - QLP = W_5 Dh_5 + (h_6 - h_5) \sum_{i=6}^9 DW_i - F(h_F - h_5)$$

$$\text{Tray 3: } V_3(H_3 - h_4) + L_5(h_5 - h_4) - V_4(H_4 - h_4)$$

$$- QLP = W_4 Dh_4$$

$$L_5 = F + V_4 + L_6 - V_5 - DW_5$$

$$L_5 = F + V_4 + V_5 + L_{10} - V_9 - DW_{6789} - V_5 - DW_5$$

$$= F + V_4 + L_{10} - V_9 - DW_{56789}$$

$$V_3(H_3 - h_4) + V_4(h_5 - H_4) + L_{10}(h_5 - h_4) - V_9(h_5 - h_4)$$

$$- QLP = W_4 Dh_4 + (h_5 - h_4) \sum_5^9 DW_i - F(h_5 - h_4)$$

$$\text{Table 2: } V_2(H_2 - h_3) + L_4(h_4 - h_3) - V_3(H_3 - h_3)$$

$$- QLP = W_3 Dh_3$$

$$L_4 = V_3 + L_5 - V_4 - DW_4$$

$$L_4 = V_3 + F + V_4 + L_{10} - V_9 - DW_{5-9} - V_4 - DW_4$$

$$= V_3 + F + L_{10} - V_9 - DW_{4-9}$$

$$V_2(H_2 - h_3) + V_3(h_4 - H_3) + L_{10}(h_4 - h_3) - V_9(h_4 - h_3)$$

$$- QLP = W_3 Dh_3 + (h_4 - h_3) \sum_4^9 DW_i - F(h_4 - h_3)$$

$$\text{Tray 1: } V_1(H_1 - h_2) + L_3(h_3 - h_2) - V_2(H_2 - h_3)$$

$$- QLP = W_2 Dh_2$$

$$L_3 = V_2 + F + L_{10} - V_9 - DW_{3-9}$$

$$V_1(H_1 - h_2) + V_2(h_3 - H_2) + L_{10}(h_3 - h_2) - V_9(h_3 - h_2) - QLP = W_2 Dh_2 + (h_3 - h_2) \sum_{i=2}^9 DW_i - F(h_3 - h_2)$$

$$\text{Reboiler: } QR + L_2(h_2 - h_1) - V_1(H_1 - h_1) - QLP = W_1 Dh_1$$

$$L_2 = V_1 + L_3 - V_2 - DW_2$$

$$\begin{aligned} L_2 &= V_1 + V_2 + F + L_{10} - V_9 - DW_{3-9} - V_2 - DW_2 \\ &= V_1 + F + L_{10} - V_9 - DW_{2-9} \end{aligned}$$

$$\begin{aligned} QR + V_1(h_2 - H_1) + L_{10}(h_2 - h_1) - V_9(h_2 - h_1) \\ - QLP &= W_1 Dh_1 + (h_2 - h_1) \sum_{i=2}^9 DW_i - F(h_2 - h_1) \end{aligned}$$

The nine equations can be summarized into the following matrix form:

$$\begin{bmatrix}
(h_2-h_1) \\
(h_1-h_2)(h_3-h_2) \\
(h_2-h_3)(h_4-h_3) \\
(h_3-h_4)(h_5-h_4) \\
(h_4-h_5)(h_6-h_5) \\
(h_5-h_6)(h_7-h_6) \\
(h_6-h_7)(h_8-h_7) \\
(h_7-h_8)(h_9-h_8) \\
(h_8-h_9)(h_9-h_9)
\end{bmatrix}
=
\begin{bmatrix}
v_1 \\
v_2 \\
v_3 \\
v_4 \\
v_5 \\
v_6 \\
v_7 \\
v_8 \\
v_9
\end{bmatrix}
\begin{bmatrix}
-(h_2-h_1) \\
-(h_3-h_2) \\
-(h_4-h_3) \\
-(h_5-h_4) \\
-(h_6-h_5) \\
-(h_7-h_6) \\
-(h_8-h_7) \\
-(h_9-h_8) \\
-(h_9-h_9)
\end{bmatrix}
\begin{bmatrix}
f_1 \\
f_2 \\
f_3 \\
f_4 \\
f_5 \\
f_6 \\
f_7 \\
f_8 \\
f_9
\end{bmatrix}$$

The f's are defined by the following equations

$$f_1 = W_1 D h_1 + (h_2 - h_1) \sum_2^9 DW_i - F(h_2 - h_1) \\ - L_{10}(h_2 - h_1) - QR + QRL$$

$$f_2 = W_2 D h_2 + (h_3 - h_2) \sum_3^9 DW_i - F(h_3 - h_2) \\ - L_{10}(h_3 - h_2) + QLP$$

$$f_3 = W_3 D h_3 + (h_4 - h_3) \sum_4^9 DW_i - F(h_4 - h_3) \\ - L_{10}(h_4 - h_3) + QLP$$

$$f_4 = W_4 D h_4 + (h_5 - h_4) \sum_5^9 DW_i - F(h_5 - h_4) \\ - L_{10}(h_5 - h_4) + QLP$$

$$f_5 = W_5 D h_5 + (h_6 - h_5) \sum_6^9 DW_i - F(h_F - h_5) \\ - L_{10}(h_6 - h_5) + QLP$$

$$f_6 = W_6 D h_6 + (h_7 - h_6) \sum_7^9 DW_i - L_{10}(h_7 - h_6) + QLP$$

$$f_7 = W_7 D h_7 + (h_8 - h_7) \sum_8^9 DW_i - L_{10}(h_8 - h_7) + QLP$$

$$f_8 = W_8 D h_8 + (h_9 - h_8) DW_9 - L_{10}(h_9 - h_8) + QLP$$

$$f_9 = W_9 D h_9 - L_{10}(h_{10} - h_9) + QLP$$

QLP - heat loss from a particular plate

QRL - heat loss from the reboiler

A more compact notation is desirable, hence, by letting $a_1 = h_2 - H_1$, $a_2 = h_3 - H_2$, etc. and $b_1 = h_2 - h_1$, etc., the above equations can be written in a compact matrix form as follows:

Matrix Equation

$$\begin{bmatrix} a_1 & & & & & & & & \\ -a_1 & a_2 & & & & & & & \\ & -a_2 & a_3 & & & & & & \\ & & -a_3 & a_4 & & & & & \\ & & & -a_4 & a_5 & & & & \\ & & & & -a_5 & a_6 & & & \\ & & & & & -a_6 & a_7 & & \\ & & & & & & -a_7 & a_8 & \\ & & & & & & & -a_8 & \\ & & & & & & & & a_9 \end{bmatrix} \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ a_9 \end{bmatrix} = \begin{bmatrix} V_1 \\ V_2 \\ V_3 \\ V_4 \\ V_5 \\ V_6 \\ V_7 \\ V_8 \\ V_9 \end{bmatrix} = \begin{bmatrix} f_1 \\ f_2 \\ f_3 \\ f_4 \\ f_5 \\ f_6 \\ f_7 \\ f_8 \\ f_9 \end{bmatrix}$$

By substitution for V_1 in the equation for V_2 , etc. it is possible to reduce the set of nine equations to one equation for V_9 (vapor flow off tray 8). This portion of the derivation is outlined in detail as follows:

Calculation of Vapor Profile

$$f_1 = a_1 V_1 + b_1 V_9$$

$$V_1 = \frac{f_1}{a_1} - \frac{b_1}{a_1 V_9}$$

$$f_2 = -a_1 V_1 + a_2 V_2 + b_2 V_9$$

$$V_2 = \frac{f_2}{a_2} - \frac{b_2}{a_2 V_9} + \frac{a_1}{a_2 V_9}$$

$$V_2 = \frac{f_2}{a_2} + \frac{f_1}{a_2} - \frac{b_1}{a_2 V_9} - \frac{b_2}{a_2 V_9}$$

$$f_3 = -a_2 V_2 + a_3 V_3 + b_3 V_9$$

$$V_3 = \frac{f_3}{a_3} - \frac{b_3}{a_3} + \frac{a_2}{a_3 V_2}$$

$$V_3 = \frac{f_1}{a_3} + \frac{f_2}{a_3} + \frac{f_3}{a_3} - \frac{b_1 V_9}{a_3} - \frac{b_2}{a_3 V_9} - \frac{b_3}{a_3 V_9}$$

$$f_4 = -a_3 V_3 + a_4 V_3 + b_4 V_9$$

$$V_4 = \frac{f_1}{a_4} + \frac{f_2}{a_4} + \frac{f_3}{a_4} - \frac{b_4}{a_4 V_9}$$

$$f_5 = a_4 V_4 + a_5 V_5 + b_5 V_9$$

$$V_5 = \frac{1}{a_5} \left(\sum_{i=1}^5 f_i - \sum_{i=1}^5 b_i V_9 \right)$$

$$f_6 = a_5 V_5 + a_6 V_6 + b_6 V_9$$

$$V_6 = \frac{1}{a_6} \left(\sum_{i=1}^6 f_i - \sum_{i=1}^6 b_i V_9 \right)$$

$$f_7 = a_6 V_6 + a_7 V_7 + b_7 V_9$$

$$V_7 = \frac{1}{a_7} \left(\sum_{i=1}^7 f_i - \sum_{i=1}^7 b_i V_9 \right)$$

$$f_8 = a_7 V_7 + a_8 V_8 + b_8 V_9$$

$$V_8 = \frac{1}{a_8} \left(\sum_{i=1}^8 f_i - \sum_{i=1}^8 b_i V_9 \right)$$

$$f_9 = -a_8 V_8 + a_9 V_9$$

$$V_9 = \frac{f_9}{a_9} + \frac{a_8}{a_9 V_8}$$

$$V_9 = \frac{f_9}{a_9} + \frac{1}{a_9} \left(\sum_{i=1}^8 f_i - \sum_{i=1}^8 b_i V_9 \right)$$

$$V_9 = \frac{1}{a_9} \sum_{i=1}^9 f_i - \frac{1}{a_9} \sum_{i=1}^8 b_i V_9$$

$$V_9 = \frac{\frac{1}{a_9} \sum_{i=1}^9 f_i}{1 + \frac{1}{a_9} \sum_{i=1}^8 b_i}$$

$$V_9 = \sum_{i=1}^9 f_i / (a_9 + \sum_{i=1}^8 b_i)$$

By back substitution the remainder of the vapor and liquid flow rate profile within the column can be calculated.

These equations were programmed for the IBM 7040 computer and used in subroutine FLOWS in the unsteady-state program.

Nomenclature used in Appendix I is as follows:

X_n - composition of the liquid on tray n , weight fraction

h_n - enthalpy of the liquid on tray n , BTU/lbm

H_n - enthalpy of the vapor off tray n , BTU/lbm

W_n - holdup of liquid on tray n , lbm

V_n - vapor flow off tray n, lbm/hr.

L_n - liquid flow off tray n, lbm/hr.

F feed flow rate, lbm/hr.

h_F - feed liquid enthalpy, BTU/lbm

A P P E N D I X I I

DATA ON THE METHANOL-WATER SYSTEM

The physical data for the methanol-water system presented in the literature are converted into a usable form. These data are presented both in graphical and tabular form.

List of Figures

- II - 1) Vapor-Liquid Equilibrium Compositions - Methanol-Water System (56)
- II - 2) Equilibrium Temperature Composition Data - Methanol-Water System (56)
- II - 3) Enthalpy Concentration Diagram - Methanol-Water System (57)
- II - 4) Saturated Liquid Densities - Methanol-Water System (58)

List of Tables

- II - 1) Vapor-Liquid Equilibrium Data for the Methanol-Water System (56)
- II - 2) Liquid Phase Enthalpy Concentration Data for the Methanol-Water System (56)
- II - 3) Saturated Liquid Densities for the Methanol-Water System (58)

Table II-1
Vapor-Liquid Equilibrium Data for
the Methanol-Water System⁽⁵⁶⁾

<u>XW</u>	<u>YW</u>	<u>TL</u>	<u>TV</u>
0.0	0.0	212.0	212.0
0.0350	0.2158	205.5	211.2
0.0689	0.3469	200.5	210.3
0.1020	0.4372	196.5	209.5
0.1339	0.5055	192.3	208.8
0.1650	0.5609	189.5	208.0
0.2026	0.6143	-	-
0.2389	0.6556	183.7	205.5
0.2739	0.6871	-	-
0.3078	0.7100	179.0	202.8
0.3405	0.7331	-	-
0.3722	0.7500	175.3	199.8
0.4028	0.7652	-	-
0.4325	0.7793	172.4	196.8
0.4612	0.7927	-	-
0.4892	0.8043	-	-
0.5162	0.8154	-	-
0.5246	0.8271	167.5	191.8
0.5926	0.8449	-	-
0.6400	0.8624	163.8	184.5
0.7273	0.8934	160.4	177.4
0.8058	0.9224	157.0	169.8
0.8767	0.9504	154.3	162.3
0.9100	-	152.4	158.5
0.9412	0.9759	151.0	154.9
0.9713	0.9881	149.8	151.5
1.000	1.000	148.5	148.5

Nomenclature

- XW - composition of the liquid phase, weight fraction
- YW - composition of the vapor phase, weight fraction
- TL - temperature of the liquid phase, °F
- TV - temperature of the vapor phase, °F

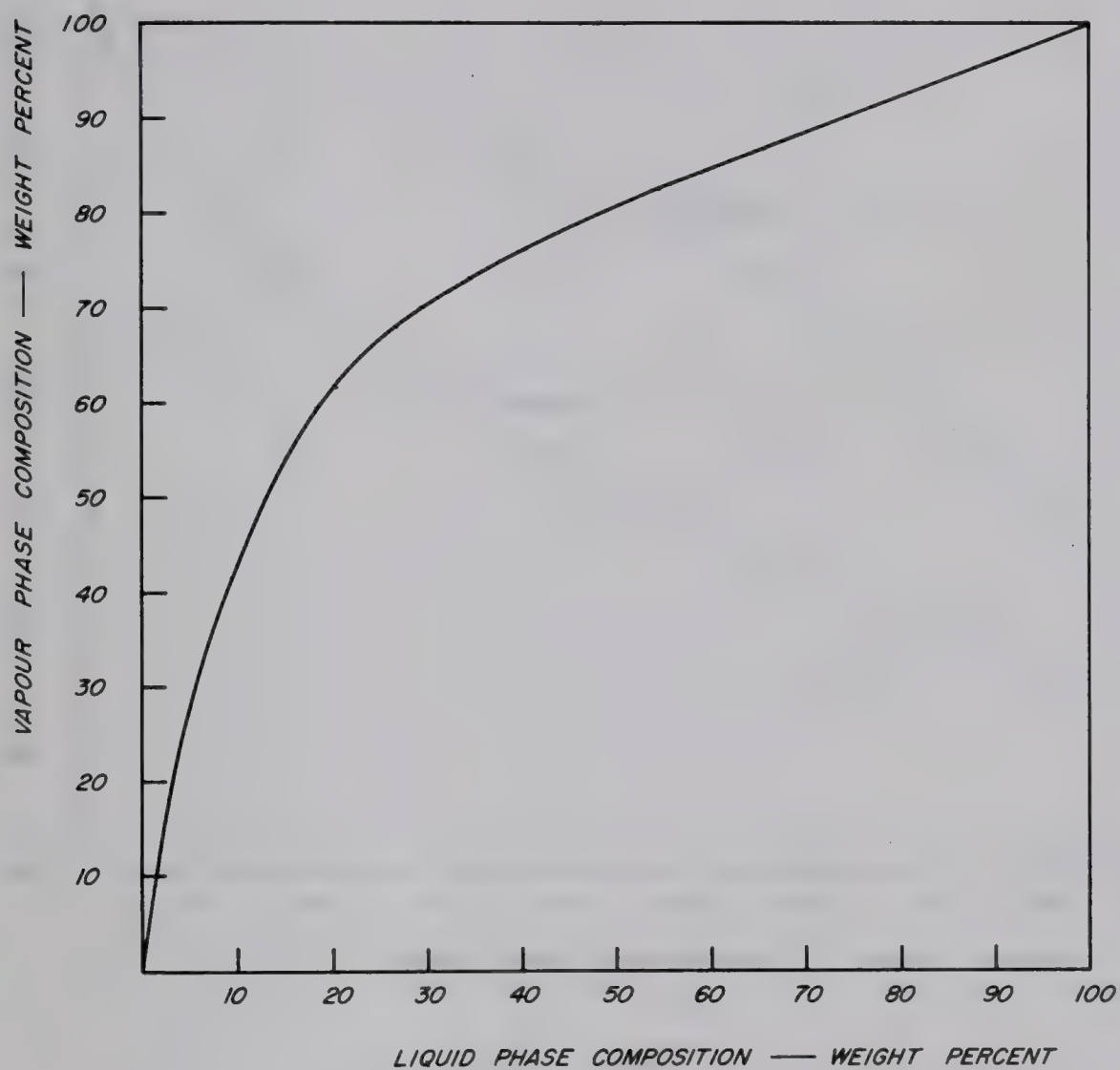


FIGURE II-1
VAPOUR-LIQUID EQUILIBRIUM COMPOSITIONS
— METHANOL - WATER SYSTEM

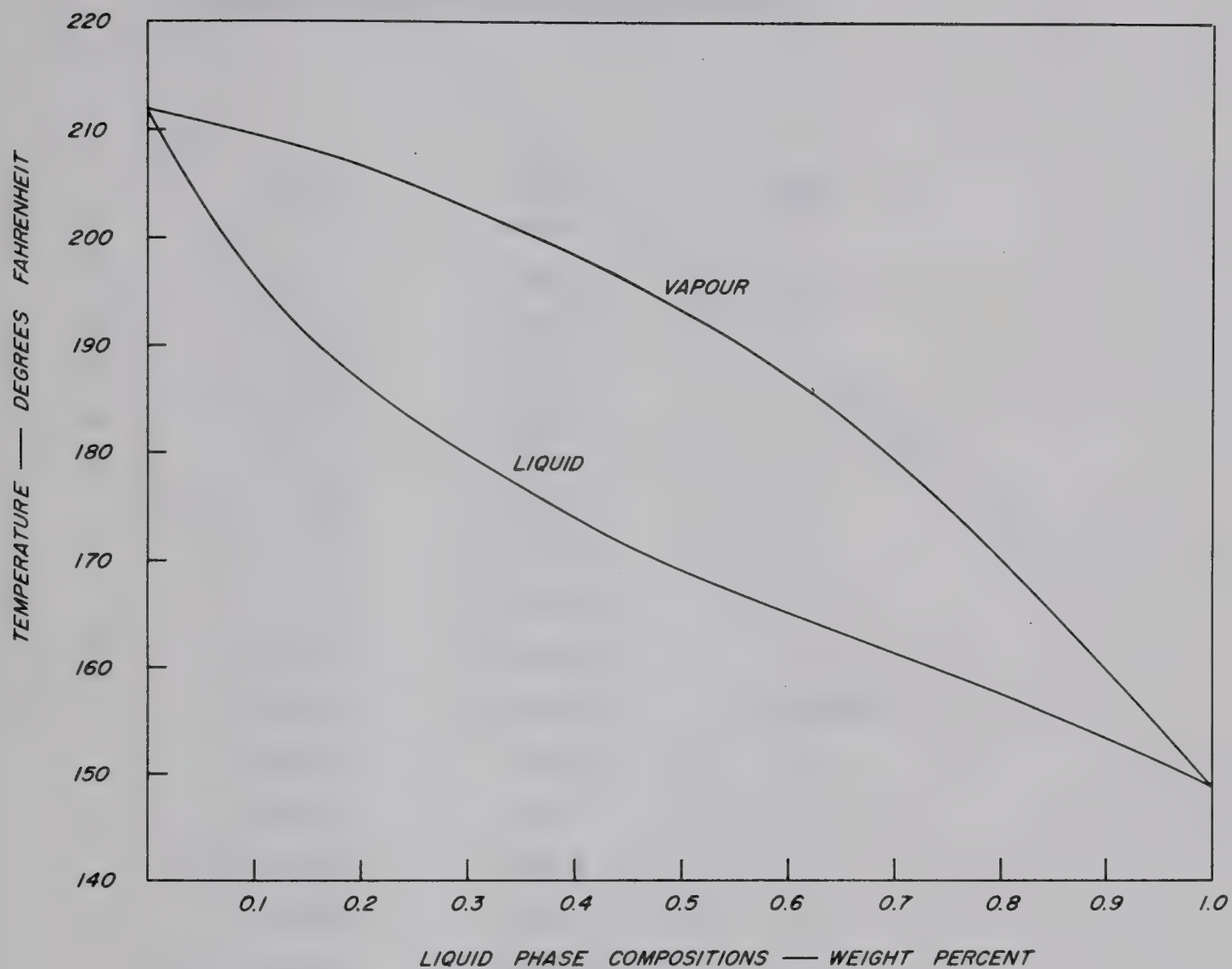


FIGURE II-2
EQUILIBRIUM TEMPERATURE COMPOSITION DATA
— METHANOL-WATER SYSTEM

Table II-2

Liquid Phase Enthalpy Concentration Data
for the Methanol-Water System⁽⁵⁷⁾

<u>XW</u>	<u>HL</u>	<u>HVT</u>
0.0	180.0	613.8
0.05	171.9	
0.10	162.9	
0.15	153.0	
0.20	142.6	
0.25	131.4	
0.30	120.6	
0.35	110.3	
0.40	101.3	Linear
0.45	95.4	
0.50	87.7	
0.55	82.4	
0.60	78.7	
0.65	76.5	
0.70	74.7	
0.75	73.4	
0.80	72.5	
0.90	71.2	
1.0	70.2	1143.0

Note: Pressure - 1 atm.

- XW - liquid phase composition, weight fraction
 HL - liquid phase enthalpy, BTU/lbm
 HVT - vapor phase enthalpy, BTU/lbm

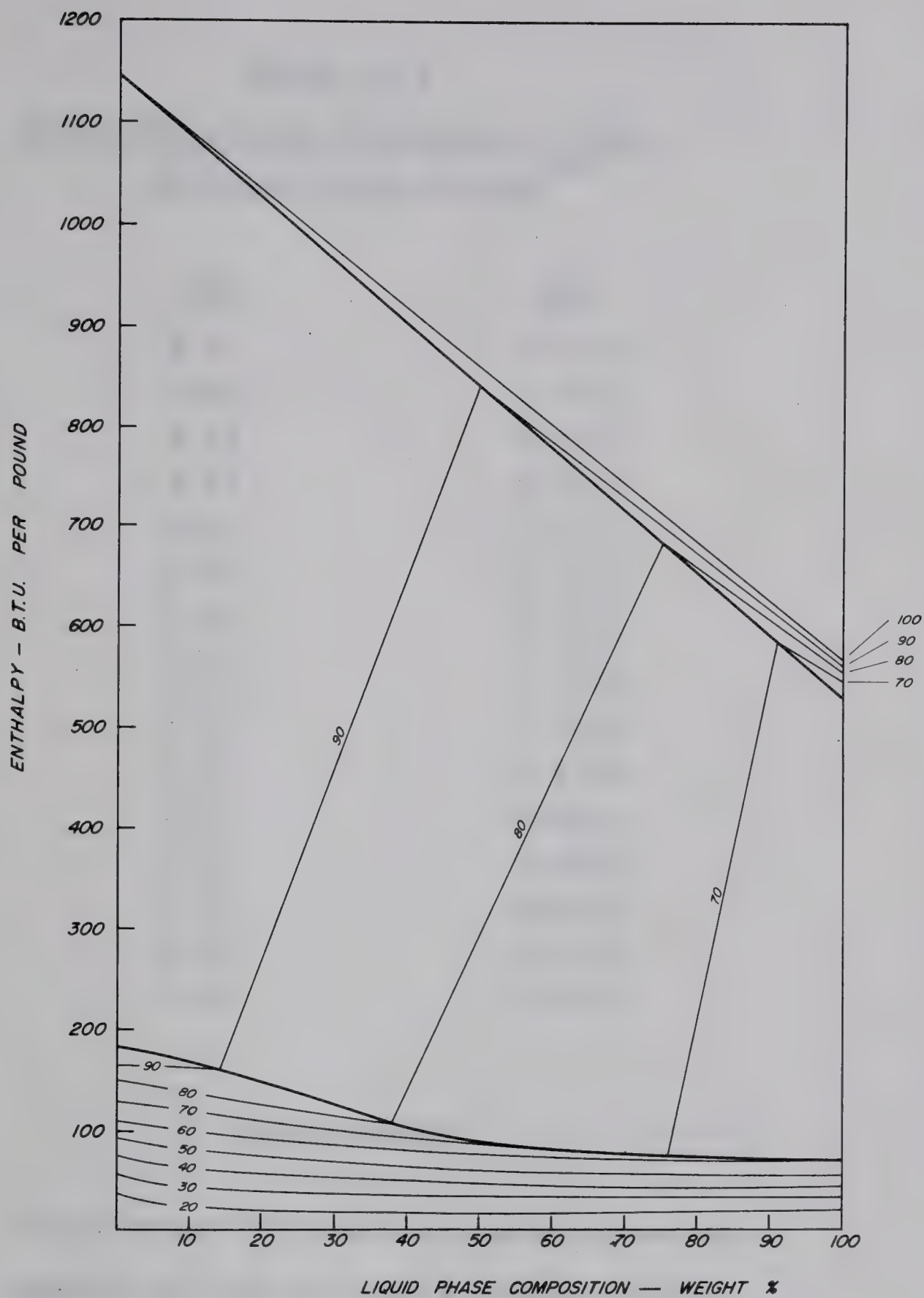


FIGURE II - 3
ENTHALPY CONCENTRATION DIAGRAM
— METHANOL - WATER SYSTEM

Table II-3
Saturated Liquid Densities for the
Methanol-Water System ⁽⁵⁸⁾

<u>XW</u>	<u>ROL</u>
0.0	0.9584
0.05	0.9521
0.10	0.9453
0.15	0.9381
0.20	0.9303
0.25	0.9222
0.30	0.9134
0.35	0.9038
0.40	0.8940
0.50	0.8728
0.60	0.8503
0.70	0.8266
0.80	0.8025
0.90	0.7770
1.00	0.7510

Nomenclature

- XW - liquid phase composition, weight fraction
- ROL - density of the saturated liquid, gm/cc

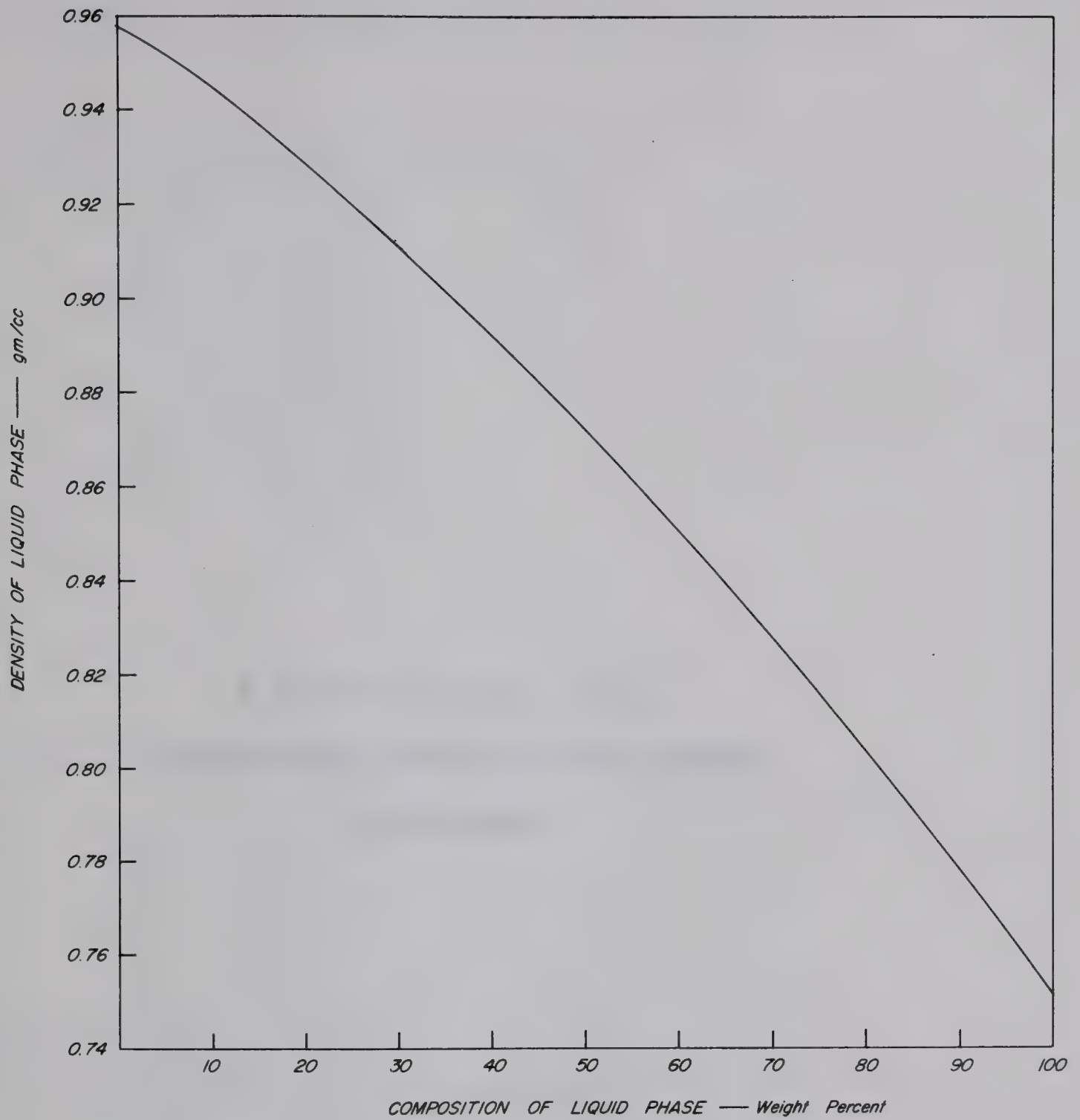


FIGURE II-4
SATURATED LIQUID DENSITY
— METHANOL WATER SYSTEM

A P P E N D I X I I I
CALIBRATION CURVES FOR THE COLUMN
FLOW RATES

Calibration data for the column flow rates are presented both in graphical and tabular form.

Calibration Curves on Figure III-1

- 1) Feed Flow Rate
- 2) Bottom Product Flow Rate
- 3) Product Flow Rate
- 4) Reflux Flow Rate
- 5) Water Flow Rate

Tables

- | | |
|-------|---------------------------|
| III-1 | Feed Flow Rate |
| III-2 | Product Flow Rate |
| III-3 | Bottoms Flow Rate |
| III-4 | Reflux Flow Rate |
| III-5 | Condenser Water Flow Rate |

Table III-1
Feed Flow Rate

Chart Percent	Feed Flow Rate, lbm/hr.
10.0	75.1
15.0	92.0
30.0	126.7
45.0	155.0
60.0	179.0

Table III-2
Product Flow Rate

Chart Percent	Flow Rate, lbm/hr.
12.0	39.7
21.0	52.5
30.0	62.9
40.0	72.8
50.0	82.0
60.0	90.5
70.0	98.0

Table III-3

Bottoms Flow Rate

<u>Chart Percent</u>	<u>Flow Rate, lbm/hr.</u>
16.0	53.6
21.5	61.0
30.0	72.3
40.0	83.3
50.0	93.0
60.6	102.3

Table III-4

Reflux Flow Rate

<u>Chart Percent</u>	<u>Flow Rate, lbm/hr.</u>
11.0	75.0
20.5	104.5
38.0	144.0
40.0	147.0
43.0	154.0

Table III-5

Condenser Water Flow Rate

<u>Chart Percent</u>	<u>Flow Rate, lbm/hr.</u>
25.0	39.6
39.0	49.4
59.5	61.0
85.0	72.8

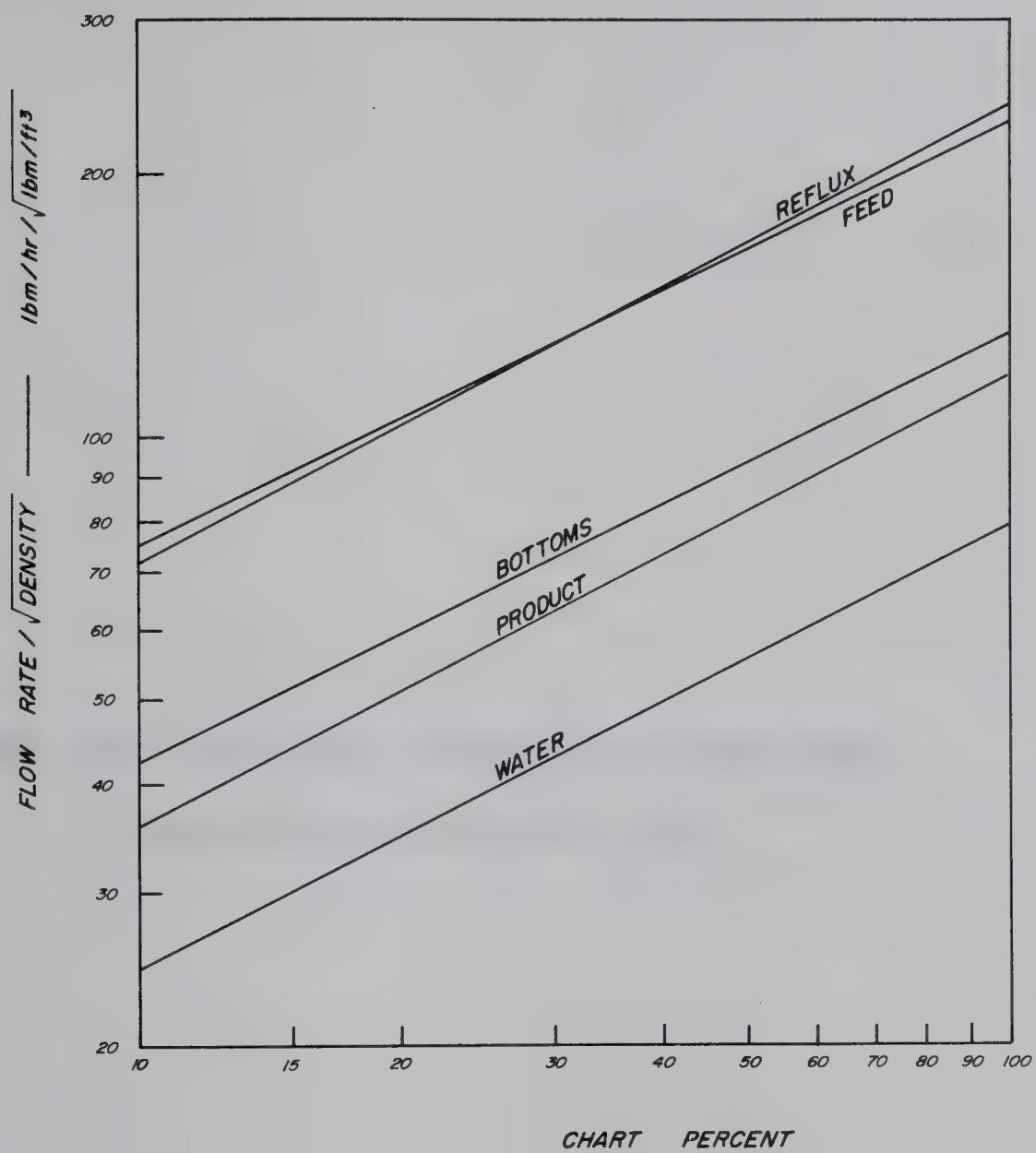


FIGURE III - 1
 CALIBRATION CURVES
 — COLUMN STREAMS

A P P E N D I X I V

RAW DATA HANDLING PROGRAM AND TRANSIENT
RESPONSE EXPERIMENTAL DATA

Appendix IV is organized into the following four parts:

- A. Raw Data Processing Fortran Program
- B. Reproducibility Experimental Data
- C. Open Loop Experimental Data
- D. Closed Loop Experimental Data

Part A, Raw Data Processing Fortran Program, is self-explanatory.

Part B contains the data used in plotting Figures 28 and 29. As will be the case throughout this Appendix, the calibration data for the runs or run is presented first, followed by the raw data in chart percent and then the converted raw data in weight fraction.

Parts C and D contain the experimental transient response data for the eight open loop experiments and six closed loop experiments, respectively. Again, the order of the tables is as indicated above in Part B.

Each part is separated by a title page with a list of the tables present in that part.

A. Raw Data Processing Fortran Program

IBFTC MAIN

RAW DATA PROCESSING

THIS PROGRAM IS COMPOSED OF THREE SUBROUTINES, MAIN-
LINE, FIT, AND DATA. THESE SUBROUTINES FIT THE CALIBR-
-ATION DATA WITH A STRAIGHT LINE USING THE LEAST
SQUARES CRITERION, CONVERT PERCENT CHART TO WEIGHT
PERCENT AND OUTPUT BOTH ON PAPER AND ON AUTOPLLOTTER.

THE MAINLINE SUBROUTINE CONTROLS THE INPUT AND EXECU-
TION OF THE REMAINDER OF THE PROGRAM.

INPUT TO SUBROUTINE FIT CONSISTS OF THE POINTS FOR THE
ABSCISSA AND FOR THE ORDINATE OF THE CALIBRATION
CURVES.

OUTPUT FROM SUBROUTINE FIT IS A SET OF A,S AND B,S
FOR THE STRAIGHT LINE $Y=A+B*X$ AND A SET OF CHECK
POINTS AT TEN PERCENT AND SIXTY PERCENT CHART.

INPUT TO SUBROUTINE DATA CONSISTS OF THE A,S AND B,S
FROM THE MAINLINE PROGRAM. THE TIMES AND THE SET OF
CORRESPONDING X,S FOR EACH TRAY ,BOTTOMS AND TOP
PRODUCT FOR A PARTICULAR EXPERIMENT AS READ FROM THE
FOXPORD DYNALOG CHARTS.

OUTPUT FROM SUBROUTINE DATA CONSISTS OF THE TIMES ,
X,S (PERCENT CHART) AND A TABLE OF WEIGHT PERCENTS
FOR THE PARTICULAR TRANSIENT RESPONSE.

VARIABLES IN THE MAINLINE PROGRAM ARE AS FOLLOWS.
A - INTERCEPT OF THE CALIBRATION CURVE
B - SLOPE OF THE CALIBRATION CURVE

VARIABLES IN THE SUBROUTINE FIT ARE AS FOLLOWS.
X - POINTS ON THE ABSCISSA - PERCENT CHART
Y - POINTS ON THE ORDINATE- WEIGHT PERCENT
A AND B - AS IN THE MAINLINE PROGRAM
XE1 AND XE2 - ABSCISSA S OF THE CHECK POINTS - PERCENT
CHART
YE1 AND YE2 - ORDINATES OF THE CHECK POINTS- WEIGHT
PERCENT

VARIABLES IN THE SUBROUTINE DATA ARE AS FOLLOWS.
T - TIME - MINUTES
A AND B - AS IN THE MAINLINE PROGRAM

RAW DATA PROCESSING

THIS PROGRAM IS COMPOSED OF THREE SUBROUTINES, MAIN, LINE, FIT, AND DATA. THESE SUBROUTINES FIT THE CALIBRATION DATA WITH A STRAIGHT LINE USING THE LEAST SQUARES METHOD, CONVERT PERCENT CHART TO WEIGHT PERCENT AND OUTPUT BOTH ON PAPER AND ON AUTOCAL.

THE MAINLINE SUBROUTINE CONTROLS THE INPUT AND OUTPUT OF THE PROGRAM.

INPUT TO SUBROUTINE FIT CONSISTS OF THE POINTS, ABSISSA AND FOR THE ORIGINATE OF THE CALIBRATION CURVES.

CUTOUT FROM SUBROUTINE FIT IS A SET OF A, S AND T, FOR THE STRAIGHT LINE $Y=A+R*X$ AND A SET OF CHE POINTS AT TEN PERCENT AND SIXTY PERCENT CHART.

INPUT TO SUBROUTINE DATA CONSISTS OF THE A, S AND T, FOR THE MAINLINE PROGRAM. THE TIMES AND THE SET OF CORRESPONDING X, S FOR EACH TRAY, BOTTOMS AND TOPS. PRODUCT FOR A PARTICULAR EXPERIMENT AS READ FROM THE EXERCISE DYNAMIC CHARTS.

CUTOUT FROM SUBROUTINE DATA CONSISTS OF THE TIMES, X, S (PERCENT CHART) AND A TABLE OF WEIGHT PERCENTS FOR THE PARTICULAR TRANSIENT RESPONSE.

VARIABLES IN THE MAINLINE PROGRAM ARE AS FOLLOWS:
A - INTERCEPT OF THE CALIBRATION CURVE
I - SLOPE OF THE CALIBRATION CURVE

VARIABLES IN THE SUBROUTINE FIT ARE AS FOLLOWS:
X - POINTS ON THE ABSISSA - PERCENT CHART
Y - POINTS ON THE ORIGINATE - WEIGHT PERCENT
A AND R - AS IN THE MAINLINE PROGRAM
XEL ABC XES - ABSISSA S OF THE CHECK POINTS - PERCENT CHART
YEL ABC YES - ORIGINATES OF THE CHECK POINTS - WEIGHT PERCENT

VARIABLES IN THE SUBROUTINE DATA ARE AS FOLLOWS:
T - TIME - MINUTES
A AND B - AS IN THE MAINLINE PROGRAM

C WT - WEIGHT PERCENT METHANOL
 C WTT - WEIGHT FRCION METHANOL
 C CH - DATA FOR THE PARTICULAR RESPOSE CURVE - PERCENT C
 1HART

C COMMON A(10),B(10),X(20),Y(20),CH(50),T(50),NP,NC,NT,I
 1,KK,ITIT(10)

DIMENSION SF(10),TT(10)

DATA TT/6HBOTTOM,6HTRAY 1,6HTRAY 2,6HTRAY 3,6HTRAY 4,6

1HTRAY 5,6HTR

1AY 6,6HTRAY 7,6HTRAY 8,6H PROD /

KPAGE=0

READ (5,9) NC,NRUNS

READ(5,7) (SF(N),N=1,NC)

1 FORMAT (1H ,I5)

2 FORMAT (1H ,6F11.5)

4 FORMAT (1HS,25X,4H A=,F13.8,4H B=,F13.8)

9 FORMAT (1H ,4I5)

7 FORMAT (1H ,10F7.2)

30 FORMAT (1H1)

31 FORMAT (1H7)

32 FORMAT (1HJ)

33 FORMAT (1H2)

WRITE(6,30)

WRITE(4,30)

WRITE(6,33)

WRITE(4,33)

CC 8 JK=1,NRUNS

READ(5,3) (ITIT(J),J=1,10)

3 FORMAT (1X,10A6)

CC 6 I=1,NC

KPAGE=KPAGE+1

IF (KPAGE.LE.2) GO TO 26

KPAGE=1

WRITE(6,30)

WRITE(4,30)

WRITE(6,33)

WRITE(4,33)

26 IF (KPAGE.LT.2) GO TO 21

WRITE(6,31)

WRITE(4,31)

21 WRITE(6,17) TT(I)

WRITE(4,17) TT(I)

17 FORMAT (1HJ,52H

ITICN CURVE -

1 ,A6)

READ(5,1) NP

READ(5,2) (X(N),N=1,NP)

READ (5,2) (Y(N),N=1,NP)

CALL FIT

WRITE(6,32)

WRITE(4,32)

WRITE(6,24)

WRITE(4,24)

24 FORMAT (1H ,54H

LIBRATION CU

DATA FOR CALIBRA

CONSTANTS FOR CA


```
1RVE)
  WRITE(6,4) A(I),B(I)
  WRITE(4,4) A(I),B(I)
6 CONTINUE
  READ (5,9) NT
  READ(5,7) (T(N),N=1,NT)
  CALL DATA
8 CONTINUE
  END
```



```

IBFTC LESQR
C**  LEAST SQUARE FIT OF CALIBRATION DATA
      SUBROUTINE FIT
      COMMON A(10),B(10),X(20),Y(20),CH(50),T(50),NP,NC,NT,I
      1, KK, ITIT(10)
      WRITE(6,4)
      WRITE(4,4)
      4  FORMAT (1FJ,50H)                                POINTS FOR ABSCI
      1SSA
      WRITE(6,5)(X(N),N=1,NP)
      WRITE(4,5)(X(N),N=1,NP)
      5  FORMAT (12X,10F6.1)
      30 FORMAT (1FJ)
      WRITE(6,6)
      WRITE(4,6)
      6  FORMAT (1FJ,50H)                                POINTS FOR ORDIN
      1ATE
      WRITE(6,7) (Y(N),N=1,NP)
      WRITE(4,7) (Y(N),N=1,NP)
      7  FORMAT (12X,7F8.4)
      SXX=C.
      SX=0.
      SXY=C.0
      SY=0.0
      DO 10 N=1,NP
      SXX=SXX+X(N)*X(N)
      SX=SX+X(N)
      SXY=SXY+X(N)*Y(N)
      10 SY=SY+Y(N)
      TNP=NP
      A(I)=(SXY/SXX-SY/SX)/(SX/SXX-TNP/SX)
      B(I)=SXY/SXX-A(I)*SX/SXX
      YE1=A(I)+B(I)*10.
      YE2=A(I)+B(I)*60.
      WRITE(6,3)
      WRITE(4,3)
      3  FORMAT (1FJ,59H)                                POINTS FOR CHECK
      1  CN EQUATION
      1  OF LINE)
      XE1=10.
      XE2=60.
      WRITE(6,8)
      WRITE(4,8)
      8  FORMAT (1FJ,56H)                                X
      1Y      X
      1  Y )
      WRITE(6,9) XE1,YE1,XE2,YE2
      WRITE(4,9) XE1,YE1,XE2,YE2
      9  FORMAT (1F ,28X,4F7.2)
      RETURN
      END

```

END
RETURN
9 FORMAT (1F, 2SX, 4F7.2)
WRITE(4,9) X1,Y1,X2,Y2
WRITE(6,9) X1,Y1,X2,Y2
10 Y)
11 X
8 FORMAT (1F7.2, 2F4.2)
WRITE(4,8)
WRITE(6,8)
X1=IC.
X2=EC.
10 GF LINE)
11 ON EQUATION
3 FORMAT (1F7.2, 2F4.2)
WRITE(4,3)
WRITE(6,3)
YES=A(1)+A(1)*EC.
YEI=A(1)+A(1)*IC.
A(1)=2X1\2X2-A(1)*2X2
A(1)=(2X1\2X2-2Y\2X)\(2X\2X-TN\2X)
TN=NP
10 2Y=2Y+Y(N)
2XY=2XY+X(N)*Y(N)
2X=2X+X(N)
2XX=2XX+X(N)*X(N)
EC IC N=1, NP
2Y=C.
2XY=C.
2X=C.
2XX=C.
7 FORMAT (1SX, 1F6.4)
WRITE(4,7) (Y(N), N=1, NP)
WRITE(6,7) (Y(N), N=1, NP)
DATE
6 FORMAT (1F7.2, 2F4.2)
WRITE(4,6)
WRITE(6,6)
30 FORMAT (1F7.2)
2 FORMAT (1SX, 10F6.1)
WRITE(4,2) (X(N), N=1, NP)
WRITE(6,2) (X(N), N=1, NP)
122A
4 FORMAT (1F7.2, 2F4.2)
WRITE(4,4)
WRITE(6,4)
1, KK, ITITIC)
COMMON A(1), I(1), X(20), Y(20), CH(2), I(2), INC, I, I
SUBROUTINE FIT
** LEAST SQUARE FIT OF CALIBRATION DATA
INTC LESSOR

IBFTC DATAB

SUBROUTINE DATA

```

COMMON A(10),B(10),X(20),Y(20),CH(50),T(50),NP,NC,NT,I
1,KK,ITIT(10)
DIMENSION TT(10),WT(50),WTT(50,10)
DATA TT/6HBOTTOM,6HTRAY 1,6HTRAY 2,6HTRAY 3,6HTRAY 4,6
1HTRAY 5,6HTR
1AY 6,6HTRAY 7,6HTRAY 8,6H PROD /
30 FORMAT (1H1)
31 FORMAT (1HS)
27 FORMAT (12X,10F6.1)
14 FORMAT (21X,4F16.8)
18 FORMAT (1X,4F16.8)
2 FORMAT (1H ,10F7.2)
WRITE(6,30)
WRITE(4,30)
WRITE(6,31)
WRITE(4,31)
WRITE(6,28) (ITIT(J),J=1,10)
WRITE(4,28) (ITIT(J),J=1,10)
28 FORMAT (20X,10A6)
WRITE(6,31)
WRITE(4,31)
WRITE(6,8)
WRITE(4,8)
8 FORMAT (1HS,67H DATA READ AT T
1HE FOLLOWING
1 TIMES - MINUTES)
WRITE(6,27)(T(N),N=1,NT)
WRITE(4,27)(T(N),N=1,NT)
WRITE(6,13)
WRITE(4,13)
13 FORMAT (1HJ,56H TRANSIENT DAT
1A - CHART PE
1RCENT)
DO 6 I=1,NC
WRITE(6,9) TT(I)
WRITE(4,9) TT(I)
9 FORMAT (1HJ,39X,A6)
READ (5,2) (CH(N),N=1,NT)
WRITE(6,27)(CH(N),N=1,NT)
WRITE(4,27)(CH(N),N=1,NT)
DO 7 N=1,NT
21 WT(N)=A(I)+B(I)*CH(N)
22 WTT(N,I)=WT(N)/100.
7 WRITE(3,3) T(N),WT(N)
3 FORMAT (1H ,2F10.5)
6 CONTINUE
WRITE(6,30)
WRITE(4,30)
WRITE(6,29) (ITIT(J),J=1,10)
WRITE(4,29) (ITIT(J),J=1,10)
29 FORMAT (1H3,26X,10A6)
WRITE(6,31)
WRITE(4,31)

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WRITE(6,16)
WRITE(4,16)
16 FORMAT (1HS,69H
INSIENT DATA
1 - WEIGHT FRACTION)
WRITE(6,12)
WRITE(4,12)
12 FORMAT(1HS,12X,77H TIME BOTTOMS TRAY 1 TRAY 2 TRAY 3 T
TRAY 4 TRAY 5
1 TRAY 6 TRAY 7 TRAY 8 PRODUCT)
DO 10 N=1,NT
IF (KK.GT.1) GO TO 15
WRITE(7,19) T(N),(WTT(N,I),I=1,NC)
15 WRITE(4,11) T(N),(WTT(N,I),I=1,NC)
10 WRITE(6,11) T(N),(WTT(N,I),I=1,NC)
11 FORMAT (1H ,11X,F7.2,10F7.4)
19 FORMAT (1X,F7.2,10F7.4)
IF (KK.GT.1) GO TO 25
M=1
WRITE(7,5) WTT(M,10),WTT(M,9),WTT(M,8),WTT(M,7),WTT(M,
16),WTT(M,5)
WRITE(7,5)WTT(M,4),WTT(M,3),WTT(M,2),WTT(M,1)
M=NT
WRITE(7,5) WTT(M,10),WTT(M,9),WTT(M,8),WTT(M,7),WTT(M,
16),WTT(M,5)
WRITE(7,5)WTT(M,4),WTT(M,3),WTT(M,2),WTT(M,1)
5 FORMAT (1X,F11.6,5F12.6)
WRITE(3,24)
24 FORMAT (6H END )
25 CONTINUE
RETURN
END

```

TRA

[illegible]

B. Reproducibility Test - Experimental Data

List of Tables

<u>Table</u>	<u>Title</u>
D-1	Calibration Data for Runs R1, R2, R3, and R4
D-2	Open Loop - Reflux Flow - Run R1 Transient Data - Chart Percent
D-3	Open Loop-Reflux Flow - Run R1 Transient Data - Weight Fraction
D-4	Open Loop - Reflux Flow - Run R2 Transient Data - Chart Percent
D-5	Open Loop - Reflux Flow - Run R2 Transient Data - Weight Fraction
D-6	Open Loop - Reflux Flow - Run R3 Transient Data - Chart Percent
D-7	Open Loop - Reflux Flow - Run R3 Transient Data - Weight Fraction
D-8	Open Loop - Reflux Flow - Run R4 Transient Data - Chart Percent
D-9	Open Loop - Reflux Flow - Run R4 Transient Data Weight Fraction

TABLE D-1 CALIBRATION DATA FOR RUNS R1,R2,R3,AND R4

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

25.5 44.0 27.2 43.5

POINTS FOR ORDINATE

5.7890 0.9933 5.9100 1.4250

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.18	60.00	-3.09

CONSTANTS FOR CALIBRATION CURVE

A= 12.82905757 B= -0.26532760

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

27.5 64.5 19.0

POINTS FOR ORDINATE

18.8300 5.7890 22.2400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	25.31	60.00	7.37

CONSTANTS FOR CALIBRATION CURVE

A= 28.89628124 B= -0.35882742

TABLE D-1 CALIBRATION DATA FOR RUNS R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

22.2 44.0 57.2 43.2

POINTS FOR ORDINATE

0.9933 5.9100 1.4250

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.18	60.00	-7.09

CONSTANTS FOR CALIBRATION CURVE
 $A = 12.8290519$ $B = -0.2624760$

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

27.2 64.2 19.0

POINTS FOR ORDINATE

18.9100 5.7890 22.2400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	22.31	60.00	7.37

CONSTANTS FOR CALIBRATION CURVE
 $A = 18.9100000$ $B = -0.1900000$

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

66.0 18.0 45.2 12.2 52.0 13.0 50.5

POINTS FOR ORDINATE

18.5500 41.9200 29.9100 46.4000 25.8900 46.0400 27.5230

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	47.14	60.00	22.06

CONSTANTS FOR CALIBRATION CURVE

A= 52.15795994 B= -0.50164548

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

18.0 59.5 12.0

POINTS FOR ORDINATE

51.8100 35.9100 54.2700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	54.97	60.00	35.71

CONSTANTS FOR CALIBRATION CURVE

A= 58.82420969 B= -0.38528080

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA
18.0 22.5 12.0 25.0 13.0 20.0

POINTS FOR ORDINATE
18.2500 41.4800 24.9100 24.9100 24.9100 24.9100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
18.00	41.14	60.00	22.00

CONSTANTS FOR CALIBRATION CURVE
 $R = 0.999999$ $R^2 = 0.999998$

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA
18.0 22.5 12.0

POINTS FOR ORDINATE
21.4100 35.9100 24.2500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
18.00	24.91	60.00	32.71

CONSTANTS FOR CALIBRATION CURVE
 $R = 0.824269$ $R^2 = 0.679428$

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

26.5 42.5 25.0

POINTS FOR ORDINATE

59.4000 52.1100 60.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	67.03	60.00	44.07

CONSTANTS FOR CALIBRATION CURVE

A= 71.62196445 B= -0.45921162

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

69.2 81.5 64.5 76.5 62.8

POINTS FOR ORDINATE

76.0100 70.5400 76.5800 73.0900 78.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.25	60.00	79.09

CONSTANTS FOR CALIBRATION CURVE

A= 102.08428288 B= -0.38319160

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSISSA
26.2 42.2 52.2

POINTS FOR ORDINATE
22.4000 22.1100 21.1500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	27.03	20.00	44.07

CONSTANTS FOR CALIBRATION CURVE
A = 1.000000 B = 0.000000

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSISSA
26.2 42.2 52.2

POINTS FOR ORDINATE
26.0100 26.2400 26.5800 26.9200 27.2600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	28.25	20.00	45.09

CONSTANTS FOR CALIBRATION CURVE
A = 1.000000 B = 0.000000

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

62.0 72.5 59.0 66.5 58.5

POINTS FOR ORDINATE

85.8300 81.8300 86.4300 83.8100 87.0600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	104.58	60.00	86.34

CONSTANTS FOR CALIBRATION CURVE

A= 108.22275925 B= -0.36469010

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

43.2 53.0 42.0

POINTS FOR ORDINATE

91.7800 89.3600 91.7100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	99.12	60.00	87.79

CONSTANTS FOR CALIBRATION CURVE

A= 101.38341141 B= -0.22648503

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSISSA

66.0 75.2 88.0 99.0

POINTS FOR ORDINATE

82.6300 81.8300 80.4300 83.8100 81.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	104.20	60.00	86.34

CONSTANTS FOR CALIBRATION CURVE

$a = 108.22212525$ $b = -0.00000000$

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSISSA

43.2 53.0 65.0

POINTS FOR ORDINATE

91.7800 82.3600 91.7100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	99.12	60.00	87.79

CONSTANTS FOR CALIBRATION CURVE

$a = 101.3034141$ $b = -0.00000000$

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

46.7 53.0 44.5

POINTS FOR ORDINATE

95.4900 94.6100 95.4200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	99.17	60.00	93.92

CONSTANTS FOR CALIBRATION CURVE

A= 100.22551918 B= -0.10510790

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

58.2 66.7 62.0 55.0

POINTS FOR ORDINATE

97.7700 96.8900 97.5200 98.0700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.53	60.00	97.61

CONSTANTS FOR CALIBRATION CURVE

A= 103.51422024 B= -0.09841619

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

46.7 23.0 44.5

POINTS FOR ORDINATE

22.4900 24.6100 25.4200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	29.17	60.00	23.95

CONSTANTS FOR CALIBRATION CURVE

A = 100.22521918 B = -.10510794

DATA FOR CALIBRATION CURVE - TRAY 9

POINTS FOR ABSCISSA

28.2 66.7 62.0 52.0

POINTS FOR ORDINATE

27.7700 26.8900 27.2500 28.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.23	60.00	27.61

CONSTANTS FOR CALIBRATION CURVE

A = 103.21422024 B = -.22916111

TABLE D-2 OPEN LOOP - REFLUX FLOW - RUN R1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0				

TRANSIENT DATA - CHART PERCENT

BOTTOM

42.5	42.5	40.8	38.5	37.5	34.0	32.0	30.0	29.5	29.0
28.8	28.0	27.5	26.0	26.0	26.0				

TRAY 1

54.5	53.5	49.0	43.5	39.0	31.5	26.0	21.0	18.5	15.5
14.0	11.0	9.0	7.0	5.0	4.0				

TRAY 2

46.0	45.0	40.5	37.0	33.0	27.2	23.0	20.0	18.0	16.0
15.0	13.0	12.5	12.4	12.2	12.0				

TRAY 3

44.5	42.8	33.5	28.5	24.5	19.5	15.5	12.2	11.0	10.2
9.0	7.6	6.5	5.2	5.0	5.0				

TRAY 4

38.0	36.2	33.0	31.0	29.5	27.8	26.5	26.0	25.5	25.2
25.0	24.8	24.2	24.0	23.8	23.5				

TRAY 5

77.2	75.5	72.0	69.5	68.2	66.8	66.0	65.0	64.8	64.5
64.0	63.5	63.2	62.5	62.0	62.0				

TRAY 6

68.0	66.5	64.8	63.2	62.2	60.8	60.0	59.8	59.5	59.5
59.3	59.2	58.9	58.9	59.0	58.8				

TRAY 7

52.0	50.5	48.2	46.8	45.5	44.0	43.5	43.0	42.8	42.2
42.0	41.5	41.0	40.8	40.8	40.8				

TRAY 8

52.0	50.5	49.0	48.0	47.0	46.0	45.2	45.0	45.0	44.8
44.5	44.0	43.8	43.5	43.2	43.0				

PROD

66.5	65.5	65.0	64.5	64.0	63.5	63.0	62.8	62.5	62.5
62.5	62.5	62.4	62.0	62.0	62.0				

TABLE D-2 PEN LOOP - FLOW - RUN RI

DATA READ AT THE FOLLOWING TIME - MINUTE

40.0	3.5	10.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0	48.0	51.0	54.0	57.0	60.0	63.0	66.0	69.0	72.0	75.0	78.0	81.0	84.0	87.0	90.0	93.0	96.0	99.0	102.0	105.0	108.0	111.0	114.0	117.0	120.0	123.0	126.0	129.0	132.0	135.0	138.0	141.0	144.0	147.0	150.0	153.0	156.0	159.0	162.0	165.0	168.0	171.0	174.0	177.0	180.0	183.0	186.0	189.0	192.0	195.0	198.0	201.0	204.0	207.0	210.0	213.0	216.0	219.0	222.0	225.0	228.0	231.0	234.0	237.0	240.0	243.0	246.0	249.0	252.0	255.0	258.0	261.0	264.0	267.0	270.0	273.0	276.0	279.0	282.0	285.0	288.0	291.0	294.0	297.0	300.0	303.0	306.0	309.0	312.0	315.0	318.0	321.0	324.0	327.0	330.0	333.0	336.0	339.0	342.0	345.0	348.0	351.0	354.0	357.0	360.0	363.0	366.0	369.0	372.0	375.0	378.0	381.0	384.0	387.0	390.0	393.0	396.0	399.0	402.0	405.0	408.0	411.0	414.0	417.0	420.0	423.0	426.0	429.0	432.0	435.0	438.0	441.0	444.0	447.0	450.0	453.0	456.0	459.0	462.0	465.0	468.0	471.0	474.0	477.0	480.0	483.0	486.0	489.0	492.0	495.0	498.0	501.0	504.0	507.0	510.0	513.0	516.0	519.0	522.0	525.0	528.0	531.0	534.0	537.0	540.0	543.0	546.0	549.0	552.0	555.0	558.0	561.0	564.0	567.0	570.0	573.0	576.0	579.0	582.0	585.0	588.0	591.0	594.0	597.0	600.0	603.0	606.0	609.0	612.0	615.0	618.0	621.0	624.0	627.0	630.0	633.0	636.0	639.0	642.0	645.0	648.0	651.0	654.0	657.0	660.0	663.0	666.0	669.0	672.0	675.0	678.0	681.0	684.0	687.0	690.0	693.0	696.0	699.0	702.0	705.0	708.0	711.0	714.0	717.0	720.0	723.0	726.0	729.0	732.0	735.0	738.0	741.0	744.0	747.0	750.0	753.0	756.0	759.0	762.0	765.0	768.0	771.0	774.0	777.0	780.0	783.0	786.0	789.0	792.0	795.0	798.0	801.0	804.0	807.0	810.0	813.0	816.0	819.0	822.0	825.0	828.0	831.0	834.0	837.0	840.0	843.0	846.0	849.0	852.0	855.0	858.0	861.0	864.0	867.0	870.0	873.0	876.0	879.0	882.0	885.0	888.0	891.0	894.0	897.0	900.0	903.0	906.0	909.0	912.0	915.0	918.0	921.0	924.0	927.0	930.0	933.0	936.0	939.0	942.0	945.0	948.0	951.0	954.0	957.0	960.0	963.0	966.0	969.0	972.0	975.0	978.0	981.0	984.0	987.0	990.0	993.0	996.0	999.0	1002.0	1005.0	1008.0	1011.0	1014.0	1017.0	1020.0	1023.0	1026.0	1029.0	1032.0	1035.0	1038.0	1041.0	1044.0	1047.0	1050.0	1053.0	1056.0	1059.0	1062.0	1065.0	1068.0	1071.0	1074.0	1077.0	1080.0	1083.0	1086.0	1089.0	1092.0	1095.0	1098.0	1101.0	1104.0	1107.0	1110.0	1113.0	1116.0	1119.0	1122.0	1125.0	1128.0	1131.0	1134.0	1137.0	1140.0	1143.0	1146.0	1149.0	1152.0	1155.0	1158.0	1161.0	1164.0	1167.0	1170.0	1173.0	1176.0	1179.0	1182.0	1185.0	1188.0	1191.0	1194.0	1197.0	1200.0	1203.0	1206.0	1209.0	1212.0	1215.0	1218.0	1221.0	1224.0	1227.0	1230.0	1233.0	1236.0	1239.0	1242.0	1245.0	1248.0	1251.0	1254.0	1257.0	1260.0	1263.0	1266.0	1269.0	1272.0	1275.0	1278.0	1281.0	1284.0	1287.0	1290.0	1293.0	1296.0	1299.0	1302.0	1305.0	1308.0	1311.0	1314.0	1317.0	1320.0	1323.0	1326.0	1329.0	1332.0	1335.0	1338.0	1341.0	1344.0	1347.0	1350.0	1353.0	1356.0	1359.0	1362.0	1365.0	1368.0	1371.0	1374.0	1377.0	1380.0	1383.0	1386.0	1389.0	1392.0	1395.0	1398.0	1401.0	1404.0	1407.0	1410.0	1413.0	1416.0	1419.0	1422.0	1425.0	1428.0	1431.0	1434.0	1437.0	1440.0	1443.0	1446.0	1449.0	1452.0	1455.0	1458.0	1461.0	1464.0	1467.0	1470.0	1473.0	1476.0	1479.0	1482.0	1485.0	1488.0	1491.0	1494.0	1497.0	1500.0	1503.0	1506.0	1509.0	1512.0	1515.0	1518.0	1521.0	1524.0	1527.0	1530.0	1533.0	1536.0	1539.0	1542.0	1545.0	1548.0	1551.0	1554.0	1557.0	1560.0	1563.0	1566.0	1569.0	1572.0	1575.0	1578.0	1581.0	1584.0	1587.0	1590.0	1593.0	1596.0	1599.0	1602.0	1605.0	1608.0	1611.0	1614.0	1617.0	1620.0	1623.0	1626.0	1629.0	1632.0	1635.0	1638.0	1641.0	1644.0	1647.0	1650.0	1653.0	1656.0	1659.0	1662.0	1665.0	1668.0	1671.0	1674.0	1677.0	1680.0	1683.0	1686.0	1689.0	1692.0	1695.0	1698.0	1701.0	1704.0	1707.0	1710.0	1713.0	1716.0	1719.0	1722.0	1725.0	1728.0	1731.0	1734.0	1737.0	1740.0	1743.0	1746.0	1749.0	1752.0	1755.0	1758.0	1761.0	1764.0	1767.0	1770.0	1773.0	1776.0	1779.0	1782.0	1785.0	1788.0	1791.0	1794.0	1797.0	1800.0	1803.0	1806.0	1809.0	1812.0	1815.0	1818.0	1821.0	1824.0	1827.0	1830.0	1833.0	1836.0	1839.0	1842.0	1845.0	1848.0	1851.0	1854.0	1857.0	1860.0	1863.0	1866.0	1869.0	1872.0	1875.0	1878.0	1881.0	1884.0	1887.0	1890.0	1893.0	1896.0	1899.0	1902.0	1905.0	1908.0	1911.0	1914.0	1917.0	1920.0	1923.0	1926.0	1929.0	1932.0	1935.0	1938.0	1941.0	1944.0	1947.0	1950.0	1953.0	1956.0	1959.0	1962.0	1965.0	1968.0	1971.0	1974.0	1977.0	1980.0	1983.0	1986.0	1989.0	1992.0	1995.0	1998.0	2001.0	2004.0	2007.0	2010.0	2013.0	2016.0	2019.0	2022.0	2025.0	2028.0	2031.0	2034.0	2037.0	2040.0	2043.0	2046.0	2049.0	2052.0	2055.0	2058.0	2061.0	2064.0	2067.0	2070.0	2073.0	2076.0	2079.0	2082.0	2085.0	2088.0	2091.0	2094.0	2097.0	2100.0	2103.0	2106.0	2109.0	2112.0	2115.0	2118.0	2121.0	2124.0	2127.0	2130.0	2133.0	2136.0	2139.0	2142.0	2145.0	2148.0	2151.0	2154.0	2157.0	2160.0	2163.0	2166.0	2169.0	2172.0	2175.0	2178.0	2181.0	2184.0	2187.0	2190.0	2193.0	2196.0	2199.0	2202.0	2205.0	2208.0	2211.0	2214.0	2217.0	2220.0	2223.0	2226.0	2229.0	2232.0	2235.0	2238.0	2241.0	2244.0	2247.0	2250.0	2253.0	2256.0	2259.0	2262.0	2265.0	2268.0	2271.0	2274.0	2277.0	2280.0	2283.0	2286.0	2289.0	2292.0	2295.0	2298.0	2301.0	2304.0	2307.0	2310.0	2313.0	2316.0	2319.0	2322.0	2325.0	2328.0	2331.0	2334.0	2337.0	2340.0	2343.0	2346.0	2349.0	2352.0	2355.0	2358.0	2361.0	2364.0	2367.0	2370.0	2373.0	2376.0	2379.0	2382.0	2385.0	2388.0	2391.0	2394.0	2397.0	2400.0	2403.0	2406.0	2409.0	2412.0	2415.0	2418.0	2421.0	2424.0	2427.0	2430.0	2433.0	2436.0	2439.0	2442.0	2445.0	2448.0	2451.0	2454.0	2457.0	2460.0	2463.0	2466.0	2469.0	2472.0	2475.0	2478.0	2481.0	2484.0	2487.0	2490.0	2493.0	2496.0	2499.0	2502.0	2505.0	2508.0	2511.0	2514.0	2517.0	2520.0	2523.0	2526.0	2529.0	2532.0	2535.0	2538.0	2541.0	2544.0	2547.0	2550.0	2553.0	2556.0	2559.0	2562.0	2565.0	2568.0	2571.0	2574.0	2577.0	2580.0	2583.0	2586.0	2589.0	2592.0	2595.0	2598.0	2601.0	2604.0	2607.0	2610.0	2613.0	2616.0	2619.0	2622.0	2625.0	2628.0	2631.0	2634.0	2637.0	2640.0	2643.0	2646.0	2649.0	2652.0	2655.0	2658.0	2661.0	2664.0	2667.0	2670.0	2673.0	2676.0	2679.0	2682.0	2685.0	2688.0	2691.0	2694.0	2697.0	2700.0	2703.0	2706.0	2709.0	2712.0	2715.0	2718.0	2721.0	2724.0	2727.0	2730.0	2733.0	2736.0	2739.0	2742.0	2745.0	2748.0	2751.0	2754.0	2757.0	2760.0	2763.0	2766.0	2769.0	2772.0	2775.0	2778.0	2781.0	2784.0	2787.0	2790.0	2793.0	2796.0	2799.0	2802.0	2805.0	2808.0	2811.0	2814.0	2817.0	2820.0	2823.0	2826.0	2829.0	2832.0	2835.0	2838.0	2841.0	2844.0	2847.0	2850.0	2853.0	2856.0	2859.0	2862.0	2865.0	2868.0	2871.0	2874.0	2877.0	2880.0	2883.0	2886.0	2889.0	2892.0	2895.0	2898.0	2901.0	2904.0	2907.0	2910.0	2913.0	2916.0	2919.0	2922.0	2925.0	2928.0	2931.0	2934.0	2937.0	2940.0	2943.0	2946.0	2949.0	2952.0	2955.0	2958.0	2961.0	2964.0	2967.0	2970.0	2973.0	2976.0	2979.0	2982.0	2985.0	2988.0	2991.0	2994.0	2997.0	3000.0	3003.0	3006.0	3009.0	3012.0	3015.0	3018.0	3021.0	3024.0	3027.0	3030.0	3033.0	3036.0	3039.0	3042.0	3045.0	3048.0	3051.0	3054.0	3057.0	3060.0	3063.0	3066.0	3069.0	3072.0	3075.0	3078.0	3081.0	3084.0	3087.0	3090.0	3093.0	3096.0	3099.0	3102.0	3105.0	3108.0	3111.0	3114.0	3117.0	3120.0	3123.0	3126.0	3129.0	3132.0	3135.0	3138.0	3141.0	3144.0	3147.0	3150.0	3153.0	3156.0	3159.0	3162.0	3165.0	3168.0	3171.0	3174.0	3177.0	3180.0	3183.0	3186.0	3189.0	3192.0	3195.0	3198.0	3201.0	3204.0	3207.0	3210.0	3213.0	3216.0	3219.0	3222.0	3225.0	3228.0	3231.0	3234.0	3237.0	3240.0	3243.0	3246.0	3249.0	3252.0	3255.0	3258.0	3261.0	3264.0	3267.0	3270.0	3273.0	3276.0	3279.0	3282.0	3285.0	3288.0	3291.0	3294.0	3297.0	3300.0	3303.0	3306.0	3309.0	3312.0	3315.0	3318.0	3321.0	3324.0	3327.0	3330.0	3333.0	3336.0	3339.0	3342.0	3345.0	3348.0	3351.0	3354.0	3357.0	3360.0	3363.0	3366.0	3369.0	3372.0	3375.0	3378.0	3381.0	3384.0	3387.0	3390.0	3393.0	3396.0	3399.0	3402.0	3405.0	3408.0	3411.0	3414.0	3417.0	3420.0	3423.0	3426.0	3429.0	3432.0	3435.0	3438.0	3441.0	3444.0
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TABLE OPEN LOOP - REFLUX FLOW - RUN R1

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0155	0.0934	0.2908	0.4168	0.5417	0.7250	0.8342	0.8961	0.9476	0.9697
2.50	0.0155	0.0970	0.2958	0.4233	0.5500	0.7315	0.8397	0.8995	0.9492	0.9707
5.00	0.0200	0.1131	0.3184	0.4592	0.5647	0.7449	0.8459	0.9047	0.9508	0.9712
7.50	0.0261	0.1329	0.3360	0.4784	0.5739	0.7545	0.8517	0.9078	0.9518	0.9717
10.00	0.0288	0.1490	0.3560	0.4938	0.5808	0.7595	0.8554	0.9108	0.9529	0.9722
15.00	0.0381	0.1759	0.3851	0.5131	0.5886	0.7649	0.8605	0.9142	0.9539	0.9726
20.00	0.0434	0.1957	0.4062	0.5285	0.5945	0.7679	0.8634	0.9153	0.9547	0.9731
25.00	0.0487	0.2136	0.4213	0.5412	0.5968	0.7718	0.8641	0.9164	0.9550	0.9733
30.00	0.0500	0.2226	0.4313	0.5459	0.5991	0.7725	0.8652	0.9169	0.9550	0.9736
35.00	0.0513	0.2333	0.4413	0.5489	0.6005	0.7737	0.8652	0.9183	0.9552	0.9736
40.00	0.0519	0.2387	0.4463	0.5536	0.6014	0.7756	0.8660	0.9187	0.9555	0.9736
50.00	0.0540	0.2495	0.4564	0.5590	0.6023	0.7775	0.8663	0.9198	0.9560	0.9736
60.00	0.0553	0.2567	0.4589	0.5632	0.6051	0.7787	0.8674	0.9210	0.9562	0.9737
70.00	0.0593	0.2638	0.4594	0.5682	0.6060	0.7813	0.8674	0.9214	0.9565	0.9741
80.00	0.0593	0.2710	0.4604	0.5690	0.6069	0.7833	0.8671	0.9214	0.9568	0.9741
90.00	0.0593	0.2746	0.4614	0.5690	0.6083	0.7833	0.8678	0.9214	0.9571	0.9741

TABLE D-4 OPEN LOOP - REFLUX FLOW - RUN R2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0				

TRANSIENT DATA - CHART PERCENT

BOTTOM

44.0	44.0	42.5	40.3	38.8	35.5	33.0	31.5	30.0	29.5
29.0	28.1	28.0	28.0	28.0	27.5				

TRAY 1

56.0	54.5	50.0	45.0	39.0	32.0	26.0	21.5	18.5	16.0
14.5	10.5	8.5	7.0	5.5	5.0				

TRAY 2

47.0	46.5	42.5	38.5	34.5	28.0	24.0	20.0	18.5	16.0
14.5	13.5	13.0	12.5	12.5	12.0				

TRAY 3

44.5	42.5	35.5	30.0	26.0	20.0	16.0	13.5	11.0	9.5
8.5	6.8	6.0	5.0	5.0	5.0				

TRAY 4

38.5	36.5	33.5	31.5	30.5	28.5	26.5	26.0	25.2	25.0
24.8	24.0	24.0	24.0	23.5	23.5				

TRAY 5

77.8	76.0	72.5	70.5	69.0	65.8	64.5	64.0	64.0	63.8
63.8	63.2	63.0	62.8	62.5	62.5				

TRAY 6

68.5	67.2	65.5	64.0	63.2	61.8	61.0	60.5	60.0	59.8
59.5	59.5	59.4	59.3	59.0	59.0				

TRAY 7

52.0	50.0	48.0	46.5	45.2	43.8	43.0	42.0	41.0	40.5
40.2	40.0	40.0	39.8	39.7	39.4				

TRAY 8

52.0	50.8	49.0	48.0	47.0	46.0	45.0	44.2	44.0	44.0
43.8	43.0	43.0	43.0	42.8	42.8				

PROD

66.0	65.5	65.0	64.5	64.5	63.5	63.4	63.0	62.5	62.5
62.5	62.5	62.0	62.0	62.0	62.0				

TABLE D-5 OPEN LOOP - REFLUX FLOW - RUN R2

TRANSIENT DATA - WEIGHT FRACTION

TIME	BTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.C115	0.0880	0.2858	0.4168	0.5394	0.7227	0.8324	0.8961	0.9476	0.9702
2.50	0.C115	0.0934	0.2883	0.4245	0.5486	0.7296	0.8372	0.9006	0.9489	0.9707
5.00	0.C155	0.1095	0.3084	0.4515	0.5624	0.7430	0.8434	0.9051	0.9508	0.9712
7.50	0.C214	0.1275	0.3284	0.4727	0.5716	0.7507	0.8488	0.9085	0.9518	0.9717
10.00	0.C253	0.1490	0.3485	0.4881	0.5762	0.7564	0.8517	0.9115	0.9529	0.9717
15.00	0.C341	0.1741	0.3811	0.5112	0.5853	0.7687	0.8568	0.9146	0.9539	0.9726
20.00	0.C407	0.1957	0.4012	0.5266	0.5945	0.7737	0.8598	0.9164	0.9550	0.9727
25.00	0.C447	0.2118	0.4213	0.5362	0.5968	0.7756	0.8616	0.9187	0.9558	0.9731
30.00	0.C487	0.2226	0.4288	0.5459	0.6005	0.7756	0.8634	0.9210	0.9560	0.9736
35.00	0.C500	0.2316	0.4413	0.5516	0.6014	0.7764	0.8641	0.9221	0.9560	0.9736
40.00	0.C513	0.2369	0.4488	0.5555	0.6023	0.7764	0.8652	0.9228	0.9562	0.9736
50.00	0.C537	0.2513	0.4539	0.5620	0.6060	0.7787	0.8652	0.9232	0.9571	0.9736
60.00	0.C540	0.2585	0.4564	0.5651	0.6060	0.7794	0.8656	0.9232	0.9571	0.9741
70.00	0.C540	0.2638	0.4589	0.5690	0.6060	0.7802	0.8660	0.9237	0.9571	0.9741
80.00	0.C540	0.2692	0.4589	0.5690	0.6083	0.7813	0.8671	0.9239	0.9573	0.9741
90.00	0.C553	0.2710	0.4614	0.5690	0.6083	0.7813	0.8671	0.9246	0.9573	0.9741

TABLE D-6 OPEN LOOP - REFLUX FLOW - RUN R3

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0

TRANSIENT DATA - CHART PERCENT

BOTTOM

27.0	27.0	27.7	29.0	30.5	33.0	34.5	36.2	37.5	38.2
38.8	39.8	40.4	40.3	40.8	40.8	41.2	42.5	43.0	44.0

TRAY 1

4.0	5.5	8.0	11.0	14.5	18.0	21.5	24.5	27.0	29.0
31.5	35.5	37.5	40.0	42.5	44.5	46.5	48.0	50.0	50.5

TRAY 2

12.0	13.2	14.8	16.5	18.0	21.5	24.5	27.0	29.0	31.5
35.0	36.5	38.5	39.0	39.8	41.0	42.5	43.0	44.0	44.0

TRAY 3

5.2	6.1	8.0	10.8	13.5	16.5	18.0	20.0	21.0	23.5
26.0	27.0	29.0	31.5	33.0	35.2	37.0	39.5	41.0	42.0

TRAY 4

23.0	24.2	26.2	28.2	29.5	30.4	30.7	31.0	31.2	31.5
30.0	31.8	32.5	33.2	34.0	34.5	35.5	36.5	37.5	37.5

TRAY 5

62.0	63.2	65.0	66.5	67.0	68.0	68.2	69.0	69.5	70.0
70.0	70.5	71.0	72.0	72.5	73.0	73.5	75.5	76.8	77.0

TRAY 6

58.5	59.5	60.8	62.0	62.2	63.0	63.5	63.8	64.5	64.8
65.0	65.0	65.2	65.5	65.5	65.8	66.0	67.0	68.0	68.0

TRAY 7

40.8	41.2	43.0	43.8	44.7	46.0	46.4	46.8	47.4	47.5
47.8	48.0	48.0	48.5	49.2	49.5	49.8	50.5	51.0	51.0

TRAY 8

42.2	43.6	44.5	45.3	45.8	46.5	47.2	47.8	48.2	48.8
48.8	49.0	49.2	49.7	49.8	49.9	50.0	50.8	51.0	51.0

PROD

61.8	62.0	62.5	62.8	63.0	63.8	64.0	64.8	65.2	65.4
65.6	65.5	65.5	65.5	65.6	66.5	66.5	66.5	66.5	66.5

TABLE D-6 OPEN LOOP - REFLEX FLOW - RUN 11

DATA READ AT THE FOLLOWING TIMES - MINUTES

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 21 IN - CORRECT PERCENT

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 20

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 19

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 18

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 17

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 16

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 15

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 14

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 13

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 12

40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

TRAY 11

TABLE D-7 OPEN LOOP - REFLUX FLOW - RUN R3

TRANSIENT DATA - WEIGHT FRACTION									
TIME	BOTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8 PRODUCT
0.00	0.0567	0.2746	0.4614	0.5682	0.6106	0.7833	0.8689	0.9214	0.9579 0.9743
2.50	0.0567	0.2692	0.4554	0.5647	0.6051	0.7787	0.8652	0.9205	0.9564 0.9741
5.00	0.0548	0.2603	0.4473	0.5574	0.5959	0.7718	0.8605	0.9164	0.9555 0.9736
7.50	0.0513	0.2495	0.4388	0.5466	0.5867	0.7660	0.8561	0.9146	0.9546 0.9733
10.00	0.0474	0.2369	0.4313	0.5362	0.5808	0.7641	0.8554	0.9126	0.9541 0.9731
15.00	0.0407	0.2244	0.4137	0.5247	0.5766	0.7603	0.8525	0.9097	0.9534 0.9724
20.00	0.0368	0.2118	0.3987	0.5189	0.5752	0.7595	0.8506	0.9087	0.9526 0.9722
25.00	0.0322	0.2011	0.3861	0.5112	0.5739	0.7564	0.8496	0.9078	0.9520 0.9714
30.00	0.0288	0.1921	0.3761	0.5073	0.5729	0.7545	0.8470	0.9065	0.9516 0.9710
35.00	0.0269	0.1849	0.3636	0.4977	0.5716	0.7526	0.8459	0.9063	0.9510 0.9708
40.00	0.0253	0.1759	0.3460	0.4881	0.5785	0.7526	0.8452	0.9056	0.9510 0.9706
50.00	0.0227	0.1616	0.3385	0.4842	0.5702	0.7507	0.8452	0.9051	0.9508 0.9707
60.00	0.0211	0.1544	0.3284	0.4765	0.5670	0.7488	0.8444	0.9051	0.9505 0.9707
70.00	0.0214	0.1454	0.3259	0.4669	0.5638	0.7449	0.8434	0.9040	0.9500 0.9707
80.00	0.0200	0.1365	0.3219	0.4611	0.5601	0.7430	0.8434	0.9024	0.9499 0.9706
90.00	0.0200	0.1293	0.3159	0.4526	0.5578	0.7411	0.8423	0.9017	0.9498 0.9697
100.00	0.0190	0.1221	0.3084	0.4457	0.5532	0.7392	0.8415	0.9010	0.9497 0.9697
110.00	0.0155	0.1167	0.3059	0.4361	0.5486	0.7315	0.8379	0.8995	0.9489 0.9697
120.00	0.0142	0.1095	0.3009	0.4303	0.5440	0.7266	0.8342	0.8983	0.9487 0.9697
130.00	0.0115	0.1078	0.3009	0.4264	0.5440	0.7258	0.8342	0.8983	0.9487 0.9697

TABLE D-8 OPEN LOOP - REFLUX FLOW - RUN R4

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0

TRANSIENT DATA - CHART PERCENT

BOTTOM

26.5	26.7	27.5	29.5	31.2	34.0	35.8	37.5	39.0	39.8
40.6	41.8	42.5	42.6	42.6	42.7	42.7	42.8	43.0	43.5

TRAY 1

4.0	5.0	7.0	11.5	13.5	18.5	22.8	26.3	29.5	32.5
35.5	41.0	43.2	45.0	46.2	47.2	48.0	49.5	50.8	51.5

TRAY 2

12.5	12.8	14.5	16.5	18.5	22.5	25.5	28.5	30.5	32.5
34.8	36.5	39.8	42.0	42.2	42.5	43.0	44.0	44.5	44.5

TRAY 3

4.9	6.0	8.5	11.5	13.2	16.2	19.0	21.0	22.5	24.8
26.5	29.0	31.5	34.0	35.5	36.2	37.2	38.0	39.2	41.0

TRAY 4

23.0	24.5	26.5	28.2	29.8	30.8	31.0	31.2	32.0	32.7
33.8	34.6	35.0	36.0	36.2	36.3	36.5	37.0	38.0	38.2

TRAY 5

62.6	63.2	65.0	66.8	67.5	69.0	69.2	70.0	70.5	71.5
71.9	72.0	73.0	73.5	74.0	74.5	74.8	75.2	76.0	77.0

TRAY 6

59.0	59.7	61.0	62.2	63.0	63.8	64.0	64.5	65.0	65.2
65.5	66.0	66.2	66.8	66.8	67.0	67.2	67.5	68.0	68.0

TRAY 7

39.9	40.6	42.2	43.5	44.8	46.2	46.5	46.8	47.0	47.2
47.8	48.5	49.0	49.2	49.5	49.7	49.8	49.8	50.2	50.2

TRAY 8

42.8	43.2	44.8	45.7	46.2	47.5	48.0	48.7	48.8	49.0
49.2	49.8	49.9	49.9	50.0	50.0	50.1	50.2	50.4	50.5

PROD

61.0	61.8	62.0	62.2	63.0	63.0	63.5	63.5	63.5	63.9
64.0	64.5	64.5	64.5	65.0	65.5	66.5	67.0	67.5	67.5

DATA READ AT THE FOLLOWING TIMES - MINUTES

40.0	35.0	30.0	25.0	20.0	15.0	10.0	5.0	0.0
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TRAY 1 DATA - CHART PERCENT

BOTTOM								
40.0	41.5	42.5	43.0	43.5	44.0	44.5	45.0	45.5
35.0	36.5	37.5	38.0	38.5	39.0	39.5	40.0	40.5
TRAY 1								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 2								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 3								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 4								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 5								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 6								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 7								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
TRAY 8								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0
PROD								
40.0	41.0	42.0	42.5	43.0	43.5	44.0	44.5	45.0
35.0	36.0	37.0	37.5	38.0	38.5	39.0	39.5	40.0

TABLE D-9 OPEN LOOP - REFLUX FLOW - RUN R4

TRANSIENT DATA - WEIGHT FRACTION

TIME BOTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0580	0.2746	0.4589	0.5694	0.6106	0.7810	0.8671	0.9235	0.9573 0.9751
2.50	0.0574	0.2710	0.4574	0.5651	0.6037	0.7787	0.8645	0.9219	0.9568 0.9743
5.00	0.0553	0.2638	0.4488	0.5555	0.5945	0.7718	0.8598	0.9183	0.9552 0.9741
7.50	0.0500	0.2477	0.4388	0.5439	0.5867	0.7649	0.8554	0.9153	0.9542 0.9739
10.00	0.0455	0.2405	0.4288	0.5374	0.5794	0.7622	0.8525	0.9124	0.9537 0.9731
15.00	0.0381	0.2226	0.4087	0.5258	0.5748	0.7564	0.8496	0.9092	0.9523 0.9731
20.00	0.0333	0.2072	0.3937	0.5150	0.5739	0.7557	0.8488	0.9085	0.9518 0.9726
25.00	0.0288	0.1946	0.3786	0.5073	0.5729	0.7526	0.8470	0.9078	0.9511 0.9726
30.00	0.0248	0.1831	0.3686	0.5016	0.5693	0.7507	0.8452	0.9074	0.9510 0.9726
35.00	0.0227	0.1723	0.3585	0.4927	0.5661	0.7469	0.8444	0.9069	0.9508 0.9723
40.00	0.0206	0.1616	0.3470	0.4861	0.5610	0.7453	0.8434	0.9056	0.9505 0.9722
50.00	0.0174	0.1418	0.3385	0.4765	0.5573	0.7449	0.8415	0.9040	0.9499 0.9717
60.00	0.0155	0.1339	0.3219	0.4669	0.5555	0.7411	0.8408	0.9029	0.9498 0.9717
70.00	0.0153	0.1275	0.3109	0.4572	0.5509	0.7392	0.8386	0.9024	0.9498 0.9717
80.00	0.0153	0.1232	0.3099	0.4515	0.5500	0.7373	0.8386	0.9017	0.9497 0.9712
90.00	0.0150	0.1196	0.3084	0.4488	0.5495	0.7354	0.8379	0.9013	0.9497 0.9707
100.00	0.0150	0.1167	0.3059	0.4449	0.5486	0.7342	0.8372	0.9010	0.9496 0.9697
110.00	0.0147	0.1113	0.3009	0.4418	0.5463	0.7327	0.8361	0.9010	0.9495 0.9692
120.00	0.0142	0.1067	0.2983	0.4372	0.5417	0.7296	0.8342	0.9001	0.9493 0.9687
130.00	0.0129	0.1042	0.2983	0.4303	0.5408	0.7258	0.8342	0.9001	0.9492 0.9687

C. Open Loop Experimental Data

<u>Table</u>	<u>Title</u>
D-10	Calibration Data for Open Loop - Feed Flow Run 1
D-11	Open Loop - Feed Flow - Run 1 Transient Data - Chart Percent
D-12	Open Loop - Feed Flow - Run 1 Transient Data - Weight Fraction
D-13	Calibration Data for Open Loop - Feed Flow Run 2
D-14	Open Loop - Feed Flow - Run 2 Transient Data - Chart Percent
D-15	Open Loop - Feed Flow - Run 2 Transient Data - Weight Fraction
D-16	Calibration Data for Open Loop - Reflux Flow - Run 1
D-17	Open Loop - Reflux Flow - Run 1 Transient Data - Chart Percent
D-18	Open Loop - Reflux Flow - Run 1 Transient Data - Weight Fraction
D-19	Calibration Data for Open Loop - Reflux Flow - Run 2
D-20	Open Loop - Reflux Flow - Run 2 Transient Data - Chart Percent
D-21	Open Loop - Reflux Flow - Run 2 Transient Data - Weight Fraction
D-22	Calibration Data for Open Loop - Steam Flow - Run 1
D-23	Open Loop - Steam Flow - Run 1 Transient Data - Chart Percent
D-24	Open Loop - Steam Flow - Run 2 Transient Data - Weight Fraction

<u>Table</u>	<u>Title</u>
D-25	Calibration Data for Open Loop - Steam Flow - Run 2
D-26	Open Loop - Steam Flow - Run 2 Transient Data - Chart Percent
D-27	Open Loop - Steam Flow - Run 2 Transient Data - Weight Fraction
D-28	Calibration Data for Open Loop - Feed Composition - Run 1
D-29	Open Loop - Feed Composition - Run 1 Transient Data - Chart Percent
D-30	Open Loop - Feed Composition - Run 1 Transient Data - Weight Fraction
D-31	Calibration Data for Open Loop - Feed Composition - Run 2
D-32	Open Loop - Feed Composition - Run 2 Transient Data - Chart Percent
D-33	Open Loop - Feed Composition - Run 2 Transient Data - Weight Fraction

TABLE D-10 CALIBRATION DATA FOR OPEN LOOP - FEED FLOW
RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

55.0 50.5 60.0 52.5 58.5 39.5 47.8 57.5

POINTS FOR ORDINATE

0.9200 1.8600 0.2241 1.0440 0.2973 4.1130 2.6600
0.1508

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.12	60.00	-0.09

CONSTANTS FOR CALIBRATION CURVE

A= 12.16080844 B= -0.20417106

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

26.4 11.5 51.5 20.8

POINTS FOR ORDINATE

8.3140 12.8100 2.4290 10.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	13.03	60.00	0.09

CONSTANTS FOR CALIBRATION CURVE

A= 15.61622393 B= -0.25872864

DATA FOR CALIBRATION CURVE - BUTTE

POINTS FOR ABSCISSA

55.0 50.0 45.0 40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

POINTS FOR ORDINATE

0.2500 0.2000 0.1500 0.1000 0.0500 0.0000 -0.0500 -0.1000 -0.1500 -0.2000 -0.2500 -0.3000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.15	60.00	-0.00

CONSTANTS FOR CALIBRATION CURVE

A = 12.16080844 B = -0.204111

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

55.0 50.0 45.0 40.0 35.0 30.0 25.0 20.0 15.0 10.0 5.0 0.0

POINTS FOR ORDINATE

8.3140 12.8100 2.4290 10.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	13.03	60.00	0.00

CONSTANTS FOR CALIBRATION CURVE

A = 12.61622393 B = -0.228111

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

31.5 15.5 57.0 25.0

POINTS FOR ORDINATE

23.2300 31.0900 8.5760 24.7800

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	33.81	60.00	7.09

CONSTANTS FOR CALIBRATION CURVE

A= 39.15009165 B= -0.53429743

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

34.5 15.5 86.5 30.5

POINTS FOR ORDINATE

41.6400 47.3400 23.5200 43.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	49.74	60.00	32.71

CONSTANTS FOR CALIBRATION CURVE

A= 53.14480400 B= -0.34065399

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

31.5 15.5 27.0 25.0

POINTS FOR ORDINATE

53.2300 31.0500 1.2700 24.7800

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	33.81	60.00	7.00

CONSTANTS FOR CALIBRATION CURVE

A = 0.100000 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

34.5 15.5 86.5 30.5

POINTS FOR ORDINATE

41.6400 47.3400 23.2500 43.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	49.75	60.00	32.71

CONSTANTS FOR CALIBRATION CURVE

A = 0.100000 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

19.2 7.0 81.0 14.0

POINTS FOR ORDINATE

58.6100 64.8400 33.3500 59.5000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.42	60.00	41.86

CONSTANTS FOR CALIBRATION CURVE

A= 66.53618145 B= -0.41126011

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

29.0 19.0 75.0 28.0 54.5 11.8 23.0 57.5

POINTS FOR ORDINATE

74.7000 78.0900 52.3000 74.6400 63.3900 81.6000 76.3333
61.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.64	60.00	59.92

CONSTANTS FOR CALIBRATION CURVE

A= 87.18699741 B= -0.45444144

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSCISSA

19.2 7.0 81.0 14.

POINTS FOR ORDINATE

58.6100 64.8400 33.3500 29.5000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.42	60.00	41.80

CONSTANTS FOR CALIBRATION CURVE

A = 0.23618143 B = -0.4115011

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSCISSA

29.0 19.0 75.0 28.0 54.5 11.8 23.0 27.5

POINTS FOR ORDINATE

74.7000 74.0900 52.5000 74.8400 63.3900 81.0000 60.1800 61.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.64	60.00	29.95

CONSTANTS FOR CALIBRATION CURVE

A = 0.18692741 B = -0.4444144

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

25.5 16.0 61.0 21.5 44.5 14.5 23.0 47.2

POINTS FOR ORDINATE

83.5800 86.0200 70.2400 84.5200 77.3330 88.4000 85.2300
76.4500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	89.26	60.00	71.28

CONSTANTS FOR CALIBRATION CURVE

A= 92.85053253 B= -0.35952316

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

17.2 11.2 43.5 16.1 29.0 7.0 13.5 31.0

POINTS FOR ORDINATE

90.0600 92.0000 83.6600 91.1200 87.0600 92.9200 91.6300
86.7700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.30	60.00	79.21

CONSTANTS FOR CALIBRATION CURVE

A= 94.91427231 B= -0.26168659

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

88.2 16.0 61.0 51.5 44.5 14.5 23.0 47.5

POINTS FOR ORDINATE

88.2 16.0 61.0 51.5 44.5 14.5 23.0 47.5

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y
10.00 89.26 60.00 71.58

CONSTANTS FOR CALIBRATION CURVE

A = 15.32023253 B = -0.15222111

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

17.2 11.2 47.5 16.1 29.0 7.0 13.5 31.0

POINTS FOR ORDINATE

86.7700 82.0000 82.0000 81.1800 81.1800 81.1800 81.1800 81.6300

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y
10.00 92.30 60.00 77.51

CONSTANTS FOR CALIBRATION CURVE

A = 14.11425231 B = -0.15222111

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

19.2 13.5 37.0 15.6 27.0 9.5 14.8 29.0

POINTS FOR ORDINATE

94.3300 95.2800 90.6800 94.7900 92.7400 96.6600 95.0700
92.1400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.18	60.00	85.82

CONSTANTS FOR CALIBRATION CURVE

A= 98.24986744 B= -0.20717970

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

54.8 51.5 64.5 51.2 60.0 50.6 52.8 60.5

POINTS FOR ORDINATE

97.3800 97.8700 95.6200 97.7700 96.4700 98.1900 97.8700
96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	105.19	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A= 106.94264317 B= -0.17495215

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSISSA
19.2 13.2 37.0 1.6 27.0 .5 14.8 29.

POINTS FOR ORDINATE
94.7900 92.7900 92.7900 92.7900 92.7900 92.7900 92.7900 92.7900
92.1400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.18	6.00	85.3

CONSTANTS FOR CALIBRATION CURVE
a = 1.249014e-05 b = 0.000000

DATA FOR CALIBRATION CURVE - FUND

POINTS FOR ABSISSA
24.8 21.2 64.2 21.2 61.0 11.6 2.8 60.

POINTS FOR ORDINATE
97.3800 97.3800 97.3800 97.3800 97.3800 97.3800 97.3800 97.3800
96.1400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.18	6.00	85.3

CONSTANTS FOR CALIBRATION CURVE
a = 1.00.942031e-05 b = 0.000000

TABLE OPEN LOOP - FEED FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0			

TRANSIENT DATA - CHART PERCENT

BOTTOM

59.5	58.0	56.8	55.0	54.0	53.5	52.0	50.5	51.0	51.0
51.0	51.5	51.8	52.0	52.0	52.8	52.3			

TRAY 1

49.5	49.5	49.0	47.0	44.5	39.0	33.0	30.0	28.5	26.5
25.5	23.8	22.5	21.8	20.8	20.0	20.0			

TRAY 2

57.0	53.5	51.0	48.5	46.5	42.5	38.5	35.0	33.0	32.0
30.5	28.4	27.5	27.0	26.2	25.0	25.0			

TRAY 3

87.0	80.5	73.5	68.0	63.5	57.0	49.0	43.0	40.0	38.0
36.0	33.0	32.5	31.0	30.0	30.2	30.2			

TRAY 4

82.0	77.0	70.5	63.0	57.0	46.5	38.2	31.0	26.5	23.0
21.0	18.5	16.5	16.4	15.5	14.5	14.5			

TRAY 5

76.5	74.0	68.5	63.0	58.0	50.5	44.5	38.0	34.5	31.8
30.5	27.2	26.5	25.2	24.8	24.5	24.5			

TRAY 6

61.5	59.5	56.0	52.5	49.0	42.0	37.0	33.5	30.5	28.2
26.8	24.8	23.5	23.5	22.2	22.0	21.8			

TRAY 7

45.0	44.5	42.5	39.5	36.5	31.8	28.5	25.5	23.5	21.5
20.5	18.5	17.2	16.8	16.8	16.1	16.1			

TRAY 8

38.2	38.2	37.8	35.5	33.8	30.0	27.0	24.5	22.0	20.5
19.8	18.5	17.2	16.8	16.5	15.8	15.8			

PROD

64.6	64.5	63.5	62.3	61.4	59.5	58.7	56.5	55.5	54.8
54.3	53.5	53.0	52.8	52.5	52.4	52.4			

DATA READ AT THE FOLLOWING TIMES - MINUTES

40.0 30.0 20.0 10.0 0.0 10.0 20.0 30.0 40.0

TRANSIENT DATA - CHART PERCENT

BOTTOM

21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0

TRAY 1

22.0 22.0 22.0 22.0 22.0 22.0 22.0 22.0 22.0

TRAY 2

23.0 23.0 23.0 23.0 23.0 23.0 23.0 23.0 23.0

TRAY 3

24.0 24.0 24.0 24.0 24.0 24.0 24.0 24.0 24.0

TRAY 4

25.0 25.0 25.0 25.0 25.0 25.0 25.0 25.0 25.0

TRAY 5

26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0 26.0

TRAY 6

27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0 27.0

TRAY 7

28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0

TRAY 8

29.0 29.0 29.0 29.0 29.0 29.0 29.0 29.0 29.0

FEED

30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0

TABLE D-12 OPEN LOOP - FEED FLOW - RUN 1

TRANSIENT DATA - WEIGHT FRACTION									
TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8 PRODUCT
0.00	0.0001	0.0281	0.0870	0.2351	0.3281	0.5242	0.7074	0.8314	0.9034 0.9564
2.50	0.0032	0.0281	0.1057	0.2572	0.3487	0.5356	0.7146	0.8327	0.9034 0.9566
5.00	0.0056	0.0294	0.1190	0.2811	0.3754	0.5606	0.7272	0.8379	0.9042 0.9583
7.50	0.0093	0.0346	0.1324	0.2998	0.4063	0.5856	0.7398	0.8458	0.9089 0.9604
10.00	0.0114	0.0410	0.1431	0.3151	0.4309	0.6083	0.7523	0.8536	0.9125 0.9620
15.00	0.0124	0.0553	0.1644	0.3373	0.4741	0.6424	0.7775	0.8659	0.9203 0.9653
20.00	0.0154	0.0708	0.1858	0.3645	0.5083	0.6696	0.7955	0.8746	0.9266 0.9667
25.00	0.0185	0.0785	0.2045	0.3850	0.5379	0.6992	0.8081	0.8824	0.9317 0.9706
30.00	0.0175	0.0824	0.2152	0.3952	0.5564	0.7151	0.8189	0.8876	0.9369 0.9723
35.00	0.0175	0.0876	0.2205	0.4020	0.5708	0.7274	0.8271	0.8929	0.9400 0.9736
40.00	0.0175	0.0902	0.2285	0.4088	0.5790	0.7333	0.8322	0.8955	0.9415 0.9744
50.00	0.0165	0.0946	0.2398	0.4190	0.5893	0.7483	0.8393	0.9007	0.9442 0.9758
60.00	0.0158	0.0979	0.2446	0.4207	0.5975	0.7514	0.8440	0.9041	0.9469 0.9767
70.00	0.0154	0.0998	0.2472	0.4258	0.5979	0.7574	0.8440	0.9052	0.9477 0.9771
80.00	0.0154	0.1023	0.2515	0.4293	0.6016	0.7592	0.8487	0.9052	0.9483 0.9776
90.00	0.0138	0.1044	0.2579	0.4286	0.6057	0.7605	0.8494	0.9070	0.9498 0.9778
100.00	0.0148	0.1044	0.2579	0.4286	0.6057	0.7605	0.8501	0.9070	0.9498 0.9778

TABLE D-13 CALIBRATION DATA FOR OPEN LOOP - FEED FLOW
RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

94.5 63.5 87.5 95.5 64.0 95.8 95.0 89.5 95.0 70.0
50.0 40.0

POINTS FOR ORDINATE

0.7000 15.1400 3.7620 0.6000 15.9900 0.6000 0.6000
2.7000 0.6000 12.3500 21.3500 26.2500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	40.35	60.00	16.97

CONSTANTS FOR CALIBRATION CURVE

A= 45.02145100 B= -0.46752675

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

64.5 7.5 37.5 65.0 7.0 64.0 49.5

POINTS FOR ORDINATE

1.2620 40.4000 19.4700 0.8830 40.9100 0.9200 11.9700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	38.75	60.00	4.21

CONSTANTS FOR CALIBRATION CURVE

A= 45.66139174 B= -0.69089743

TABLE D-13 CALIBRATION DATA FOR OPEN LOOP - RE-TRAY

DATA FOR CALIBRATION CURVE - RE-TRAY

POINTS FOR RE-TRAY

50.0	40.0	30.0	20.0	10.0	0.0	-10.0	-20.0	-30.0	-40.0	-50.0
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POINTS FOR ORIGIN

0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
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POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
10.00	40.35	20.00	80.70	30.00	121.05	40.00	161.40	50.00	201.75	60.00	242.10

CONSTANTS FOR CALIBRATION CURVE

$$Y = 4.035X - 0.000$$

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR TRAY 1

64.5	55.0	45.0	35.0	25.0	15.0	5.0	-5.0	-15.0	-25.0	-35.0	-45.0	-55.0	-64.5
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POINTS FOR ORIGIN

0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
10.00	36.75	20.00	73.50	30.00	110.25	40.00	147.00	50.00	183.75	60.00	220.50

CONSTANTS FOR CALIBRATION CURVE

$$Y = 3.675X - 0.000$$

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

75.5 24.3 40.0 76.5 25.0 74.5

POINTS FOR ORDINATE

4.4090 51.9600 37.5200 4.3500 52.2000 6.2150

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	65.53	60.00	19.30

CONSTANTS FOR CALIBRATION CURVE

A= 74.77465725 B= -0.92461666

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

71.5 20.0 25.5 74.5 19.0 71.0 65.5 36.5 68.0

POINTS FOR ORDINATE

14.9900 56.7700 50.8200 13.4400 56.8600 14.9200 19.8200
42.0900 17.7000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	63.79	60.00	24.14

CONSTANTS FOR CALIBRATION CURVE

A= 71.72138309 B= -0.79309514

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ARCSIN

75.2 54.3 40.0 35.0 30.0 25.0

POINTS FOR COSINE

4.000 3.996 3.983 3.961 3.930 3.891

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	65.53	60.00	19.3

CONSTANTS FOR CALIBRATION CURVE

A = 14.17462725 B = -0.9346166

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ARCSIN

71.2 50.0 35.2 24.2 19.0 11.0 02.0 08.0

POINTS FOR COSINE

14.000 13.996 13.983 13.961 13.930 13.891 13.852 13.813

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	65.53	60.00	24.14

CONSTANTS FOR CALIBRATION CURVE

A = 11.15138309 B = -0.19309214

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

70.5 23.3 26.0 72.0 23.0 64.0 60.5 38.5 63.0

POINTS FOR ORDINATE

33.9100 58.4700 57.3400 32.1100 58.7500 35.8500 38.6200
51.0700 37.3400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	65.91	60.00	38.87

CONSTANTS FOR CALIBRATION CURVE

A= 71.32010937 B= -0.54088245

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

74.5 22.5 25.0 68.3 23.0 58.5 63.5 40.0 64.0

POINTS FOR ORDINATE

40.9700 73.6600 73.1300 46.8800 78.1200 51.6100 48.0700
62.7200 48.1200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	83.54	60.00	50.82

CONSTANTS FOR CALIBRATION CURVE

A= 90.08984184 B= -0.65451534

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSISSA

10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

POINTS FOR ORDINATE

11.0700 27.3400 32.1100 38.1000 44.1000 50.1000 56.1000 62.1000 68.1000 74.1000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.91	60.00	34.87

CONSTANTS FOR CALIBRATION CURVE
A = 0.00000000 B = 0.00000000

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSISSA

10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

POINTS FOR ORDINATE

62.7200 73.6600 78.1300 82.6000 87.0700 91.5400 96.0100 100.4800 104.9500 109.4200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	87.24	60.00	20.11

CONSTANTS FOR CALIBRATION CURVE
A = 0.00000000 B = -0.00000000

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

63.2 21.0 21.5 49.5 20.5 43.5 51.2 35.2 50.0

POINTS FOR ORDINATE

55.7700 83.0500 82.6300 65.5800 83.2800 69.3900 62.8100
73.1700 64.3500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	90.02	60.00	57.99

CONSTANTS FOR CALIBRATION CURVE

A= 96.42164421 B= -0.64050843

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

52.0 19.0 19.5 38.5 18.5 35.5 44.5 33.5 40.8

POINTS FOR ORDINATE

71.8900 85.3600 89.1400 79.7600 89.1700 81.1700 76.8500
81.9500 77.9700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.92	60.00	68.42

CONSTANTS FOR CALIBRATION CURVE

A= 99.02010918 B= -0.51000991

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

63.5 51.0 44.5 37.5 30.5 23.5 16.5 9.5

POINTS FOR ORDINATE

81.1700 83.6500 86.1300 88.6100 91.0900 93.5700 96.0500 98.5300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	90.05	60.00	97.99

CONSTANTS FOR CALIBRATION CURVE

$A = 0.0000000000000000$ $B = -0.0000000000000000$

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

52.0 45.0 38.0 31.0 24.0 17.0 10.0 3.0

POINTS FOR ORDINATE

81.2500 83.7300 86.2100 88.6900 91.1700 93.6500 96.1300 98.6100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.99	60.00	98.99

CONSTANTS FOR CALIBRATION CURVE

$A = 0.0000000000000000$ $B = -0.0000000000000000$

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

49.5 19.0 19.5 35.5 19.5 31.0 41.0 33.0 39.8

POINTS FOR ORDINATE

83.3200 93.7000 93.7400 88.4300 93.8100 89.6900 86.2100
88.8400 86.7300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.96	60.00	79.72

CONSTANTS FOR CALIBRATION CURVE

A= 100.41233444 B= -0.34482631

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

67.5 53.0 52.0 60.8 52.5 58.5 60.8 60.2 60.0

POINTS FOR ORDINATE

92.7800 97.1000 97.1000 94.8600 96.8900 95.2800 94.8200
95.0000 95.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	108.80	60.00	94.98

CONSTANTS FOR CALIBRATION CURVE

A= 111.55948925 B= -0.27632861

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSCISSA

49.5 11.5 19.5 31.5 41.5 51.5

POINTS FOR ORDINATE

8.8400 96.1300
9.3200 97.1600 98.4500 99.8100 82.0500 99.2100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.96	60.00	10.15

CONSTANTS FOR CALIBRATION CURVE
A = 101.413144 B = -0.000001

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSCISSA

67.5 27.5 47.5 67.5 87.5 107.5

POINTS FOR ORDINATE

22.0000 25.0500
22.1800 27.1000 27.8800 28.4500 29.2100 29.8100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	108.80	60.00	94.15

CONSTANTS FOR CALIBRATION CURVE
A = 111.224852 B = -0.000001

TABLE D-14 OPEN LOOP - FEED FLOW - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	45.0	50.0	55.0	60.0	70.0	80.0	90.0	100.0	110.0

TRANSIENT DATA - CHART PERCENT

BOTTOM

85.8	86.4	88.0	90.0	91.2	93.0	94.0	94.9	95.1	95.8
96.0	96.2	96.3	96.2	96.2	96.1	95.8	95.0	95.0	95.0

TRAY 1

36.8	38.5	42.4	45.1	47.5	52.0	55.2	57.3	59.0	60.0
61.5	62.5	63.0	63.5	64.0	64.0	63.8	63.5	63.8	64.0

TRAY 2

39.5	41.0	43.8	46.2	48.5	52.5	57.2	61.3	64.7	67.5
69.0	70.5	71.8	72.0	72.8	73.5	73.8	74.0	74.0	74.0

TRAY 3

26.0	26.1	28.0	30.0	31.8	36.5	40.8	45.2	48.8	53.5
57.0	60.8	63.2	64.8	66.8	68.8	70.2	70.8	71.0	71.0

TRAY 4

25.5	25.5	26.0	27.0	27.5	30.3	32.7	36.8	40.5	43.5
47.2	50.0	53.0	57.0	57.5	61.5	63.7	64.5	64.8	65.5

TRAY 5

23.5	23.5	23.8	24.0	24.2	26.2	28.6	31.0	34.0	37.5
40.5	42.0	46.0	48.0	50.0	54.5	56.5	58.5	59.0	60.0

TRAY 6

21.4	21.4	21.5	21.6	21.8	22.5	23.8	25.2	26.8	28.6
30.8	32.0	34.3	36.0	38.2	40.6	42.0	43.6	44.5	44.7

TRAY 7

19.0	19.0	19.0	19.0	19.0	19.2	20.2	21.5	22.5	23.8
25.2	26.5	27.3	28.1	29.0	31.5	32.5	33.2	34.9	35.0

TRAY 8

19.5	19.3	19.2	19.2	19.2	19.5	19.8	21.0	22.0	23.5
25.0	26.0	26.5	27.5	29.5	30.0	31.0	32.2	32.5	32.5

PROD

52.5	52.2	52.2	51.9	52.5	52.3	52.8	53.3	53.8	54.5
55.0	55.7	56.5	57.0	57.4	58.2	58.8	59.4	59.5	59.6

TABLE D-17 OPEN LOOP - FEED FLOW - RUN

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	5.5	10.0	15.0	20.0	25.0	30.0	35.0	40.0
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TRANSIENT DATA - CHART PERCENT

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
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BOTTOM

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 1

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 2

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 3

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 4

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 5

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 6

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

TRAY 7

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
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TRAY 8

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
------	------	------	------	------	------	------	------	------

PROD

26.0	26.2	26.3	26.5	26.7	26.8	26.9	27.0	27.1
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TABLE D-15 OPEN LOOP - FEED FLOW - RUN 2

TRANSIENT DATA - WEIGHT FRACTION									
TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8 PRODUCT
0.00	0.0C491	0.2024	0.3825	0.5110	0.5753	0.7471	0.8271	0.8933	0.9369 0.9705
2.50	0.0C463	0.1906	0.3687	0.5102	0.5753	0.7471	0.8271	0.8933	0.9376 0.9714
5.00	0.0C388	0.1637	0.3428	0.4951	0.5726	0.7451	0.8265	0.8933	0.9379 0.9714
7.50	0.0C294	0.1450	0.3206	0.4793	0.5672	0.7438	0.8259	0.8933	0.9379 0.9722
10.00	0.0C238	0.1284	0.2993	0.4650	0.5645	0.7425	0.8246	0.8933	0.9379 0.9705
15.00	0.0C154	0.0973	0.2623	0.4277	0.5493	0.7294	0.8201	0.8923	0.9369 0.9711
20.00	0.0C107	0.0752	0.2189	0.3936	0.5363	0.7137	0.8118	0.8872	0.9358 0.9697
25.00	0.0C065	0.0607	0.1810	0.3587	0.5142	0.6980	0.8028	0.8805	0.9317 0.9683
30.00	0.0C056	0.0490	0.1495	0.3302	0.4941	0.6784	0.7926	0.8754	0.9283 0.9669
35.00	0.0C023	0.0421	0.1236	0.2929	0.4779	0.6555	0.7810	0.8688	0.9231 0.9650
40.00	0.0C014	0.0317	0.1098	0.2651	0.4579	0.6358	0.7669	0.8617	0.9179 0.9636
45.00	0.0C005	0.0248	0.0959	0.2350	0.4428	0.6260	0.7593	0.8550	0.9145 0.9617
50.00	0.0C000	0.0213	0.0839	0.2160	0.4265	0.5998	0.7445	0.8510	0.9127 0.9595
55.00	0.0C005	0.0179	0.0820	0.2033	0.4049	0.5867	0.7336	0.8469	0.9093 0.9581
60.00	0.0C005	0.0144	0.0746	0.1874	0.4022	0.5736	0.7195	0.8423	0.9024 0.9570
70.00	0.0C009	0.0144	0.0682	0.1716	0.3806	0.5442	0.7042	0.8295	0.9007 0.9548
80.00	0.0C023	0.0158	0.0654	0.1605	0.3687	0.5311	0.6952	0.8244	0.8972 0.9531
90.00	0.0C061	0.0179	0.0635	0.1557	0.3643	0.5180	0.6850	0.8209	0.8931 0.9515
100.00	0.0C061	0.0158	0.0635	0.1541	0.3627	0.5147	0.6792	0.8122	0.8921 0.9512
110.00	0.0C061	0.0144	0.0635	0.1541	0.3589	0.5082	0.6779	0.8117	0.8921 0.9509

TABLE D-16 CALIBRATION DATA FOR OPEN LOOP - REFLUX FLOW
RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

61.5 54.0 68.0 51.8

POINTS FOR ORDINATE

1.1530 3.0070 0.4438 2.7180

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	9.71	60.00	1.64

CONSTANTS FOR CALIBRATION CURVE

A= 11.31843281 B= -0.16129167

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

34.0 7.5 66.5 7.5

POINTS FOR ORDINATE

11.0000 16.5600 4.9420 17.2700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	16.30	60.00	6.09

CONSTANTS FOR CALIBRATION CURVE

A= 18.33642030 B= -0.20410114

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

41.5 17.0 62.0 10.0

POINTS FOR ORDINATE

24.4300 34.8200 16.2000 36.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	36.92	60.00	17.09

CONSTANTS FOR CALIBRATION CURVE

A= 40.88474035 B= -0.39662039

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

41.0 16.5 67.0 10.0

POINTS FOR ORDINATE

42.4800 50.2600 35.0100 51.1700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	51.61	60.00	37.05

CONSTANTS FOR CALIBRATION CURVE

A= 54.51680660 B= -0.29105743

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

41.5 17.0 62.0 10.0

POINTS FOR ORDINATE

24.4800 34.0000 10.2000 36.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	36.92	60.00	17.00

CONSTANTS FOR CALIBRATION CURVE

A = 0.00000000 B = -0.00000000

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

41.0 11.5 67.0 10.0

POINTS FOR ORDINATE

42.4800 20.2000 35.0000 21.1700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	21.61	60.00	37.00

CONSTANTS FOR CALIBRATION CURVE

A = 0.00000000 B = -0.00000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

32.0 6.5 70.0 5.5

POINTS FOR ORDINATE

58.6600 67.3200 47.9100 68.0900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	66.24	60.00	50.71

CONSTANTS FOR CALIBRATION CURVE

A= 69.34877396 B= -0.31065877

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

46.8 28.0 79.5 26.8

POINTS FOR ORDINATE

73.4600 79.4800 64.0900 80.3900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	85.11	60.00	69.87

CONSTANTS FOR CALIBRATION CURVE

A= 88.15438557 B= -0.30479042

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSISSA

5.0 10.0 15.0

POINTS FOR ORDINATE

8.000 8.350 8.700 9.050

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	88.24	60.00	20.71

CONSTANTS FOR CALIBRATION CURVE
A = 0.3487396 B = -0.816111

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSISSA

40.8 58.0 75.2 92.4

POINTS FOR ORDINATE

73.4600 75.4800 84.0200 80.3400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	85.11	60.00	69.87

CONSTANTS FOR CALIBRATION CURVE
A = 0.1243825 B = -0.3041

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

31.0 22.8 45.5

POINTS FOR ORDINATE

83.9500 87.4700 77.7700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.93	60.00	71.57

CONSTANTS FOR CALIBRATION CURVE

A= 97.20316505 B= -0.42718527

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

16.8 7.8 29.0 7.2

POINTS FOR ORDINATE

90.4600 92.7100 86.6900 93.0300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.21	60.00	77.90

CONSTANTS FOR CALIBRATION CURVE

A= 95.07324314 B= -0.28623313

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSCISSA

31.0 22.8 4.1

POINTS FOR ORIGINATE

2500 81.4700 77.17

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.14	92.93	60.00	71.21

CONSTANTS FOR CALIBRATION CURVE
a = 0.000000 b = 0.000000

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSCISSA

16.8 7.8 2.0 7.1

POINTS FOR ORIGINATE

20.4600 22.7100 86.5900 23.0300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.21	60.00	77.90

CONSTANTS FOR CALIBRATION CURVE
a = 0.000000 b = 0.000000

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

16.0 5.8 23.0 5.5

POINTS FOR ORDINATE

94.0000 95.9600 92.1000 95.9100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	95.05	60.00	84.28

CONSTANTS FOR CALIBRATION CURVE

A= 97.20081711 B= -0.21537322

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

55.5 52.5 62.8 52.5

POINTS FOR ORDINATE

97.5200 98.0500 96.4300 98.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	104.71	60.00	96.86

CONSTANTS FOR CALIBRATION CURVE

A= 106.27787781 B= -0.15701526

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSCISSA

16.0 5.8 53.0 5.5

POINTS FOR ORDINATE

94.0000 95.9600 95.1000 95.9100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	9.05	60.00	84.58

CONSTANTS FOR CALIBRATION CURVE

A = 97.2008111 B = -0.218111

DATA FOR CALIBRATION CURVE - F

POINTS FOR ABSCISSA

55.5 55.5 65.9 55.5

POINTS FOR ORDINATE

97.5200 98.0500 96.4300 98.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	104.71	60.00	96.86

CONSTANTS FOR CALIBRATION CURVE

A = 111.2181111 B = -1.1501511

TABLE D-17 OPEN LOOP - REFLUX FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	

TRANSIENT DATA - CHART PERCENT

BOTTOM

67.5	67.5	66.5	61.0	56.0	56.0	56.5	56.5	56.0	55.0
55.0	53.5	53.0	52.5	53.0	53.0	52.5	52.5	52.5	

TRAY 1

53.8	53.2	48.5	41.5	38.5	35.0	28.5	23.0	21.0	17.0
16.0	14.5	13.5	11.5	9.5	8.0	7.5	7.5	7.5	

TRAY 2

63.0	61.5	55.5	50.0	46.0	41.0	35.0	32.5	30.0	26.5
23.5	20.0	15.5	13.8	13.5	13.5	14.0	14.5	16.0	

TRAY 3

78.5	73.5	65.5	59.0	53.5	46.5	37.0	33.0	31.0	26.5
22.5	18.5	15.5	14.0	14.0	15.5	17.0	17.5	17.5	

TRAY 4

71.5	66.0	56.0	49.0	43.0	34.0	27.0	23.5	21.2	18.0
15.0	11.5	9.5	8.5	7.5	6.0	5.8	5.8	5.8	

TRAY 5

80.0	78.0	69.0	61.0	55.0	48.0	44.0	41.5	40.2	38.0
36.0	33.2	31.0	30.5	29.0	28.5	27.8	28.0	28.0	

TRAY 6

48.0	47.5	45.0	42.0	38.5	34.5	31.0	30.0	28.2	27.0
26.5	25.8	24.8	23.8	23.5	23.2	22.7	22.7	22.5	

TRAY 7

29.5	26.0	23.0	20.5	19.0	16.0	14.0	13.0	12.0	11.5
10.8	9.8	9.2	8.5	8.2	8.0	8.0	8.0	8.0	

TRAY 8

32.5	30.0	26.5	23.2	20.5	17.5	14.5	13.0	11.5	10.5
9.8	9.2	8.0	7.8	6.5	6.0	5.8	5.8	5.8	

PROD

62.3	61.3	60.5	59.5	58.2	56.4	55.5	55.5	55.0	54.5
54.5	53.5	53.0	53.0	52.5	52.5	52.5	52.5	52.5	

TABLE D-1 CPM LOOP - REFLEX FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTE

40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	130.0	140.0	150.0	160.0	170.0	180.0	190.0	200.0	210.0	220.0	230.0	240.0	250.0	260.0	270.0	280.0	290.0	300.0	310.0	320.0	330.0	340.0	350.0	360.0	370.0	380.0	390.0	400.0	410.0	420.0	430.0	440.0	450.0	460.0	470.0	480.0	490.0	500.0	510.0	520.0	530.0	540.0	550.0	560.0	570.0	580.0	590.0	600.0	610.0	620.0	630.0	640.0	650.0	660.0	670.0	680.0	690.0	700.0	710.0	720.0	730.0	740.0	750.0	760.0	770.0	780.0	790.0	800.0	810.0	820.0	830.0	840.0	850.0	860.0	870.0	880.0	890.0	900.0	910.0	920.0	930.0	940.0	950.0	960.0	970.0	980.0	990.0	1000.0
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TRANSIENT DATA - CHART PERCENT

BOTTOM		TRAY 1		TRAY 2		TRAY 3		TRAY 4		TRAY 5		TRAY 6		TRAY 7		TRAY 8		PROD	
47.5	47.5	23.8	23.8	63.0	63.0	78.2	78.2	71.2	71.2	80.0	80.0	48.0	48.0	20.2	20.2	32.2	32.2	52.3	52.3
47.5	47.5	14.1	14.1	23.2	23.2	18.2	18.2	11.2	11.2	33.2	33.2	22.2	22.2	26.0	26.0	2.2	2.2	23.2	23.2
47.5	47.5	13.7	13.7	13.2	13.2	15.2	15.2	26.0	26.0	78.0	78.0	42.0	42.0	2.2	2.2	8.0	8.0	11.2	11.2
47.5	47.5	41.2	41.2	20.2	20.2	62.2	62.2	42.0	42.0	62.0	62.0	42.0	42.0	20.2	20.2	26.2	26.2	42.0	42.0
47.5	47.5	38.2	38.2	16.0	16.0	14.0	14.0	43.0	43.0	29.0	29.0	38.2	38.2	19.0	19.0	20.2	20.2	19.0	19.0
47.5	47.5	9.2	9.2	13.2	13.2	12.2	12.2	6.0	6.0	29.0	29.0	23.2	23.2	8.2	8.2	1.2	1.2	8.2	8.2
47.5	47.5	35.0	35.0	41.2	41.2	11.0	11.0	34.0	34.0	48.0	48.0	34.2	34.2	16.0	16.0	17.2	17.2	48.0	48.0
47.5	47.5	1.2	1.2	14.2	14.2	17.2	17.2	2.8	2.8	27.8	27.8	11.0	11.0	13.0	13.0	14.2	14.2	27.8	27.8
47.5	47.5	21.0	21.0	36.2	36.2	31.0	31.0	1.2	1.2	41.2	41.2	28.2	28.2	15.0	15.0	11.2	11.2	41.2	41.2
47.5	47.5	7.2	7.2	14.2	14.2	17.2	17.2	2.8	2.8	27.8	27.8	11.0	11.0	13.0	13.0	14.2	14.2	27.8	27.8

TABLE D-18 OPEN LOOP - REFLUX FLOW - RUN 1

TRANSIENT DATA - WEIGHT FRACTION										
TIME	BOTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0043	0.0736	0.1590	0.3167	0.4714	0.6377	0.7670	0.8663	0.9020	0.9650
2.50	0.0043	0.0748	0.1649	0.3312	0.4885	0.6438	0.7691	0.8763	0.9074	0.9665
5.00	0.0059	0.0844	0.1887	0.3545	0.5195	0.6712	0.7798	0.8849	0.9149	0.9678
7.50	0.0148	0.0987	0.2105	0.3734	0.5413	0.6956	0.7926	0.8921	0.9220	0.9694
10.00	0.0229	0.1048	0.2264	0.3895	0.5599	0.7139	0.8076	0.8963	0.9279	0.9714
15.00	0.0229	0.1119	0.2462	0.4098	0.5879	0.7352	0.8247	0.9049	0.9343	0.9742
20.00	0.0221	0.1252	0.2700	0.4375	0.6096	0.7474	0.8396	0.9107	0.9408	0.9756
25.00	0.0221	0.1364	0.2799	0.4491	0.6205	0.7551	0.8439	0.9135	0.9440	0.9756
30.00	0.0229	0.1405	0.2899	0.4549	0.6276	0.7590	0.8516	0.9164	0.9472	0.9764
35.00	0.0245	0.1487	0.3037	0.4680	0.6376	0.7657	0.8567	0.9178	0.9494	0.9772
40.00	0.0245	0.1507	0.3156	0.4797	0.6469	0.7718	0.8588	0.9198	0.9509	0.9772
50.00	0.0269	0.1538	0.3295	0.4913	0.6578	0.7804	0.8618	0.9227	0.9522	0.9788
60.00	0.0277	0.1558	0.3474	0.5001	0.6640	0.7871	0.8661	0.9244	0.9548	0.9796
70.00	0.0285	0.1599	0.3541	0.5044	0.6671	0.7886	0.8704	0.9264	0.9552	0.9796
80.00	0.0277	0.1640	0.3553	0.5044	0.6702	0.7932	0.8716	0.9273	0.9580	0.9803
90.00	0.0277	0.1670	0.3553	0.5001	0.6748	0.7947	0.8729	0.9278	0.9591	0.9803
100.00	0.0285	0.1681	0.3533	0.4957	0.6755	0.7968	0.8751	0.9278	0.9595	0.9803
110.00	0.0285	0.1681	0.3513	0.4942	0.6755	0.7962	0.8751	0.9278	0.9595	0.9803
120.00	0.0285	0.1681	0.3454	0.4942	0.6755	0.7962	0.8759	0.9278	0.9595	0.9803

TABLE D-19 CALIBRATION DATA FOR OPEN LOOP - REFLUX FLOW
RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

61.5 54.0 68.0 51.8

POINTS FOR ORDINATE

1.1530 3.0070 0.4438 2.7180

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	9.71	60.00	1.64

CONSTANTS FOR CALIBRATION CURVE

A= 11.31843281 B= -0.16129167

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

34.0 7.5 66.5 7.5

POINTS FOR ORDINATE

11.0000 16.5600 4.9420 17.2700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	16.30	60.00	6.09

CONSTANTS FOR CALIBRATION CURVE

A= 18.33642030 B= -0.20410114

TABLE D-19 CALIBRATION DATA FOR OPEN LOOP - REFLEX FLOW

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSISSA

61.5 24.0 68.0 51.8

POINTS FOR ORDINATE

1.1230 3.0070 1.4438 2.7180

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	7.71	60.00	1.14

CONSTANTS FOR CALIBRATION CURVE

$A = 11.31843281$ $B = -0.141111$

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSISSA

34.0 7.5 66.5 7.5

POINTS FOR ORDINATE

11.0000 16.5600 4.9450 11.5700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	1.30	60.00	6.00

CONSTANTS FOR CALIBRATION CURVE

$A = 11.31843281$ $B = -0.141111$

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

41.5 17.0 62.0 10.0

POINTS FOR ORDINATE

24.4300 34.8200 16.2000 36.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	36.92	60.00	17.09

CONSTANTS FOR CALIBRATION CURVE

A= 40.88474035 B= -0.39662039

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

41.0 16.5 67.0 10.0

POINTS FOR ORDINATE

42.4800 50.2600 35.0100 51.1700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	51.61	60.00	37.05

CONSTANTS FOR CALIBRATION CURVE

A= 54.51680660 B= -0.29105743

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSISSA
41.5 17.0 65.0 10.0

POINTS FOR ORDINATE
34.430 34.850 1.500 36.330

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	35.95	60.00	15.09

CONSTANTS FOR CALIBRATION CURVE
A = 0.0044032 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSISSA
41.0 16.5 65.0 10.0

POINTS FOR ORDINATE
34.430 34.850 1.500 36.330

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	35.95	60.00	15.09

CONSTANTS FOR CALIBRATION CURVE
A = 0.0044032 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

32.0 6.5 70.0 5.5

POINTS FOR ORDINATE

58.6600 67.3200 47.9100 68.0900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	66.24	60.00	50.71

CONSTANTS FOR CALIBRATION CURVE

A= 69.34877396 B= -0.31065877

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

46.8 28.0 79.5 26.8

POINTS FOR ORDINATE

73.4600 79.4800 64.0900 80.3900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	85.11	60.00	69.87

CONSTANTS FOR CALIBRATION CURVE

A= 88.15438557 B= -0.30479042

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSISSA

32.0 6.2 70.0 1.2

POINTS FOR ORDINATE

61.3500 47.9100 61.9900

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y

10.00 60.24 60.00 50.71

CONSTANTS FOR CALIBRATION CURVE

A = 0.0017396 B = -0.0105877

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSISSA

46.8 28.0 79.2 56.1

POINTS FOR ORDINATE

72.4800 64.0500 80.3900

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y

10.00 62.11 60.00 62.87

CONSTANTS FOR CALIBRATION CURVE

A = 0.001543822 B = -0.0105877

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

12.3 45.5

POINTS FOR ORDINATE

87.7700 77.7700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	88.46	60.00	73.40

CONSTANTS FOR CALIBRATION CURVE

A= 91.47482204 B= -0.30120489

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

16.8 7.8 29.0 7.2

POINTS FOR ORDINATE

90.4600 92.7100 86.6900 93.0300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.21	60.00	77.90

CONSTANTS FOR CALIBRATION CURVE

A= 95.07324314 B= -0.28623313

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSISSA

15.3 45.8

POINTS FOR ORDINATE

84.7700 77.7700

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y

15.3 88.4 45.8 77.7

CONSTANTS FOR CALIBRATION CURVE

A = 0.000000 B = -0.001000

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSISSA

16.8 52.0 7.2

POINTS FOR ORDINATE

90.4600 82.7100 86.6200 83.00

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y

16.8 92.51 52.0 80.00 7.2 77.90

CONSTANTS FOR CALIBRATION CURVE

A = 0.000000 B = -0.001000

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

16.0 5.8 23.0 5.5

POINTS FOR ORDINATE

94.0000 95.9600 92.1000 95.9100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	95.05	60.00	84.28

CONSTANTS FOR CALIBRATION CURVE

A= 97.20081711 B= -0.21537322

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

55.5 52.5 62.8 52.5

POINTS FOR ORDINATE

97.5200 98.0500 96.4300 98.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	104.71	60.00	96.86

CONSTANTS FOR CALIBRATION CURVE

A= 106.27787781 B= -0.15701526

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

16.0 2.8 23.4 2.2

POINTS FOR ORDINATE

24.1000 22.9600 22.1000 22.9100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
16.00	22.02	20.00	24.20

CONSTANTS FOR CALIBRATION CURVE

A = 27.208111 B = -0.212373

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

22.2 22.2 22.2 22.2

POINTS FOR ORDINATE

27.2200 28.0200 28.4300 29.0200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
16.00	104.71	20.00	24.20

CONSTANTS FOR CALIBRATION CURVE

A = 11.277181 B = -0.123173

TABLE D-20 OPEN LOOP - REFLUX FLOW - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0		

TRANSIENT DATA - CHART PERCENT

BOTTOM

52.8	53.2	54.3	56.6	59.5	64.0	67.0	68.5	68.5	68.5
68.5	70.5	71.0	71.0	71.0	70.0	69.5	68.5		

TRAY 1

7.5	10.0	13.5	18.0	22.5	31.5	37.0	42.0	44.5	46.5
48.0	51.5	55.0	56.5	57.5	57.5	57.0	56.5		

TRAY 2

9.0	10.8	15.0	20.0	25.0	33.0	39.0	42.0	44.5	47.5
50.0	54.0	58.0	59.5	60.5	61.0	61.5	61.5		

TRAY 3

10.5	12.7	18.0	22.5	28.5	36.5	43.5	48.5	53.0	56.5
59.5	66.5	73.5	76.5	77.5	79.5	79.5	79.5		

TRAY 4

7.4	9.8	13.0	17.5	21.5	30.0	38.0	41.0	45.5	47.5
50.0	58.0	66.0	68.5	71.6	73.0	72.5	72.5		

TRAY 5

28.8	31.0	33.8	36.5	38.8	46.0	51.8	55.0	59.0	61.8
65.0	70.0	75.0	78.5	78.5	80.0	80.0	79.5		

TRAY 6

13.5	13.5	13.5	14.5	16.0	19.5	22.5	25.0	28.0	30.5
32.5	36.2	38.5	41.8	43.0	44.5	45.5	45.5		

TRAY 7

7.5	9.8	11.0	12.5	13.7	16.5	17.5	19.0	21.0	21.5
22.5	24.5	27.5	28.5	29.0	30.0	30.0	30.0		

TRAY 8

6.5	8.5	10.2	12.3	13.5	16.0	18.0	21.0	22.0	23.5
24.5	27.5	29.5	31.5	32.0	32.8	33.0	33.0		

PROD

52.5	53.0	53.8	54.8	55.2	55.8	57.0	57.8	58.5	59.0
59.5	60.5	61.5	62.0	62.5	62.5	62.8	62.8		

TABLE D-21 OPEN LOOP - REFLUX FLOW - RUN 2

TRANSIENT DATA - WEIGHT FRACTION										
TIME	BOTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.00280	0.1681	0.3732	0.5146	0.6705	0.7938	0.8741	0.9293	0.9580	0.9803
2.50	0.00274	0.1630	0.3660	0.5082	0.6630	0.7871	0.8741	0.9227	0.9537	0.9796
5.00	0.00256	0.1558	0.3494	0.4928	0.6531	0.7785	0.8741	0.9192	0.9500	0.9783
7.50	0.00219	0.1466	0.3295	0.4797	0.6391	0.7703	0.8711	0.9150	0.9455	0.9767
10.00	0.00172	0.1374	0.3097	0.4622	0.6267	0.7633	0.8666	0.9115	0.9429	0.9761
15.00	0.00100	0.1191	0.2780	0.4389	0.6003	0.7413	0.8560	0.9035	0.9375	0.9752
20.00	0.00051	0.1078	0.2542	0.4186	0.5754	0.7237	0.8470	0.9006	0.9332	0.9733
25.00	0.00027	0.0976	0.2423	0.4040	0.5661	0.7139	0.8394	0.8963	0.9268	0.9720
30.00	0.00027	0.0925	0.2324	0.3909	0.5521	0.7017	0.8304	0.8906	0.9246	0.9709
35.00	0.00027	0.0885	0.2205	0.3807	0.5459	0.6932	0.8229	0.8892	0.9214	0.9701
40.00	0.00027	0.0854	0.2105	0.3720	0.5382	0.6834	0.8169	0.8863	0.9192	0.9694
50.00	0.00005	0.0783	0.1947	0.3516	0.5133	0.6682	0.8057	0.8806	0.9128	0.9678
60.00	0.00013	0.0711	0.1788	0.3312	0.4885	0.6530	0.7988	0.8720	0.9085	0.9662
70.00	0.00013	0.0680	0.1729	0.3225	0.4807	0.6423	0.7888	0.8692	0.9042	0.9654
80.00	0.00013	0.0660	0.1689	0.3196	0.4712	0.6423	0.7852	0.8677	0.9031	0.9646
90.00	0.00003	0.0660	0.1669	0.3138	0.4667	0.6377	0.7807	0.8649	0.9014	0.9646
100.00	0.00011	0.0670	0.1649	0.3138	0.4683	0.6377	0.7777	0.8649	0.9009	0.9642
110.00	0.00027	0.0680	0.1649	0.3138	0.4683	0.6392	0.7777	0.8649	0.9009	0.9642

TABLE D-22 CALIBRATION DATA FOR OPEN LOOP - STEAM FLOW
RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

21.5 46.0 56.8 50.0 58.5

POINTS FOR ORDINATE

11.6400 4.1130 0.6805 2.6970 0.2973

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	15.18	60.00	-0.27

CONSTANTS FOR CALIBRATION CURVE

A= 18.26977253 B= -0.30893927

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

4.0 46.2 84.8 59.5

POINTS FOR ORDINATE

38.1000 20.1800 5.1830 14.1500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	35.28	60.00	14.73

CONSTANTS FOR CALIBRATION CURVE

A= 39.39437199 B= -0.41112847

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR CHECK ON EQUATION OF LINE

POINTS FOR ORIGINATE

POINTS FOR ABSISSA

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR CHECK ON EQUATION OF LINE

POINTS FOR ORIGINATE

POINTS FOR ABSISSA

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR CHECK ON EQUATION OF LINE

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

7.0 30.8 75.5 39.0 79.0 24.5 46.7

POINTS FOR ORDINATE

52.4000 39.3700 15.3500 35.0000 12.9500 43.0900 31.3400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	50.89	60.00	23.64

CONSTANTS FOR CALIBRATION CURVE

A= 56.33830738 B= -0.54501871

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

5.0 24.7 74.5 32.0

POINTS FOR ORDINATE

58.9800 52.5500 34.3300 49.3000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	57.37	60.00	39.54

CONSTANTS FOR CALIBRATION CURVE

A= 60.93287945 B= -0.35661906

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ASCISSA

7.0 30.8 15.2 39.0 19.0 24.2 4.1

POINTS FOR ORDINATE

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	2.89	61.00	23.8

CONSTANTS FOR CALIBRATION CURVE

A = 26.33830738 B = -0.0001071

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ASCISSA

2.0 24.1 14.5 32.0

POINTS FOR ORDINATE

58.5800 52.5200 34.5300 49.3000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	27.37	60.00	18.37

CONSTANTS FOR CALIBRATION CURVE

A = 26.3387945 B = -0.0001071

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

2.5 15.7 62.0 29.0

POINTS FOR ORDINATE

75.6000 70.1200 48.9900 65.4500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	72.79	60.00	50.38

CONSTANTS FOR CALIBRATION CURVE

A= 77.27746010 B= -0.44825865

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

7.2 17.5 49.0 21.2 5.8 54.5

POINTS FOR ORDINATE

84.9700 80.5000 66.0200 78.2000 85.1200 63.3900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	83.52	60.00	60.99

CONSTANTS FOR CALIBRATION CURVE

A= 88.02126694 B= -0.45056446

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSISSA

2.5 15.7 62.0 29.0

POINTS FOR ORDINATE

10.000 11.130 11.130 11.130

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	11.13	60.00	20.3

CONSTANTS FOR CALIBRATION CURVE
A = 17.2746010 B = -0.4452885

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSISSA

7.5 17.5 21.5 24.5

POINTS FOR ORDINATE

84.2700 86.5000 86.5200 78.1300 82.1300 81.1300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	83.25	60.00	60.25

CONSTANTS FOR CALIBRATION CURVE
A = 17.2746010 B = -0.4452885

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

7.8 12.1 30.0 15.0 16.0

POINTS FOR ORDINATE

91.0200 87.8800 79.2400 87.2000 86.8000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	89.63	60.00	63.72

CONSTANTS FOR CALIBRATION CURVE

A= 94.81213474 B= -0.51817894

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

5.0 11.7 31.0 13.5

POINTS FOR ORDINATE

94.8600 93.2400 87.0400 92.3200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.48	60.00	78.24

CONSTANTS FOR CALIBRATION CURVE

A= 96.52702332 B= -0.30470747

DATA FOR CALIBRATION CURVE - TRAY

01-12 FEB 1951

7.8 11.1 30.0 10.1 10.1

401712 FOR ORIGINATE

18.88 0000, 18 0045, 17 0088, 18 0050, 19

POINTS FOR CHECK ON EQUATION OF LINE

Y	X	Y	X
1.80	00.00	80.80	00.01

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 7

1967 ELR ABSC 122A

5.0 11.7 31.0 13.0

PC INTS FOR ORIGINATE

05E.SP 0040.YR 004S.SP 0036.AP

Y	X	Y	X
45.81	00.00	84.89	00.00

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

10.0 15.0 31.3 17.0

POINTS FOR ORDINATE

97.3100 96.0100 92.8900 95.4900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	97.11	60.00	87.00

CONSTANTS FOR CALIBRATION CURVE

A= 99.12818527 B= -0.20208383

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

48.8 51.0 58.5 51.5 56.2 51.5 56.8 60.0 50.6 52.8
60.5

POINTS FOR ORDINATE

98.6800 98.1500 96.7500 97.8700 97.2000 97.8700 97.2400
96.4700 98.1900 97.8700 96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	105.59	60.00	96.49

CONSTANTS FOR CALIBRATION CURVE

A= 107.40858173 B= -0.18195324

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ARCSIN

10.0 15.0 21.3 17.

POINTS FOR ORDINATE

97.8100 96.0100 95.0000 94.0000

POINTS FOR CHECK ON EQUATION OF LINE

10.00 97.11 96.00 97.00

CONSTANTS FOR CALIBRATION CURVE

A = 99.12818257 B = -0.2020888

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ARCSIN

48.8 51.0 58.5 51.5 56.5 51.5 56.8 60.0 55.5

POINTS FOR ORDINATE

96.4700 96.1500 96.8500 97.8500 97.5000 97.5000 97.5000 97.5000 97.5000

POINTS FOR CHECK ON EQUATION OF LINE

10.00 105.59 60.00 96.49

CONSTANTS FOR CALIBRATION CURVE

A = 100.4028173 B = -0.1811111

TABLE D-23 OPEN LOOP - STEAM FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0						

TRANSIENT DATA - CHART PERCENT

BOTTOM

49.5	48.2	44.5	40.0	37.5	35.5	33.5	31.2	30.5	28.8
27.5	26.0	25.5	25.5						

TRAY 1

61.0	51.5	37.0	31.0	30.0	23.0	17.0	14.0	10.0	9.0
8.0	7.5	7.0	7.0						

TRAY 2

40.5	34.2	28.0	23.8	20.8	16.5	13.5	11.0	10.0	9.5
9.0	8.5	8.5	8.5						

TRAY 3

32.5	27.0	23.5	20.0	18.0	14.5	12.0	10.5	9.5	8.8
6.0	6.5	6.5	6.5						

TRAY 4

25.5	21.5	17.5	14.5	12.0	9.5	7.0	5.5	5.5	4.0
3.5	3.5	3.0	3.0						

TRAY 5

21.5	18.5	16.0	14.2	13.0	10.2	9.0	8.5	8.0	7.8
6.5	6.0	5.5	5.5						

TRAY 6

15.7	14.2	13.0	11.7	11.0	10.0	9.0	8.5	8.2	7.8
8.0	7.5	7.5	7.5						

TRAY 7

13.8	11.5	10.0	9.0	7.5	6.2	5.2	4.5	4.5	4.0
3.1	3.1	3.0	3.0						

TRAY 8

18.0	17.0	16.0	14.2	13.5	12.0	11.0	10.5	10.0	10.5
10.5	10.0	10.0	10.0						

PROD

51.5	51.5	51.3	51.0	50.5	50.0	50.0	49.8	49.6	49.5
49.0	48.9	48.8	48.8						

TABLE D-23 OPEN LOOP - 21.5 FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0

TRANSIENT DATA - CHART PERCENT

BOTTOM									
49.5	48.5	44.5	40.0	37.5	35.5	33.5	31.5	30.5	28.5
51.5	50.0	52.5	52.5						
TRAY 1									
61.0	51.5	47.5	41.5	38.0	33.0	14.0	10.0		
61.0	51.5	47.5	41.5	38.0	33.0	14.0	10.0		
TRAY 2									
40.5	34.5	28.0	23.8	20.5	18.5	11.5	10.0		
40.5	34.5	28.0	23.8	20.5	18.5	11.5	10.0		
TRAY 3									
35.5	27.0	23.5	20.0	17.0	14.5	12.0	10.5		
35.5	27.0	23.5	20.0	17.0	14.5	12.0	10.5		
TRAY 4									
27.5	21.5	17.5	14.5	12.0	10.5	7.5	5.5		
27.5	21.5	17.5	14.5	12.0	10.5	7.5	5.5		
TRAY 5									
21.5	16.5	14.0	14.5	13.0	10.5	9.0	7.5		
21.5	16.5	14.0	14.5	13.0	10.5	9.0	7.5		
TRAY 6									
15.5	14.5	13.5	11.5	11.0	10.5	8.5	7.5		
15.5	14.5	13.5	11.5	11.0	10.5	8.5	7.5		
TRAY 7									
13.8	11.5	10.5	9.0	7.5	6.5	5.5	4.5		
13.8	11.5	10.5	9.0	7.5	6.5	5.5	4.5		
TRAY 8									
18.0	14.0	10.0	14.5	13.5	12.0	11.0	10.5		
18.0	14.0	10.0	14.5	13.5	12.0	11.0	10.5		
PROJ									
51.5	51.5	51.5	51.0	50.5	50.0	50.0	49.5		
49.0	48.5	48.5	48.8						

TABLE D-24 OPEN LOOP - STEAM FLOW - RUN 1

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0000	0.1432	0.3427	0.4934	0.6585	0.7833	0.8668	0.9232	0.9549	0.9804
2.50	0.0000	0.1822	0.3770	0.5130	0.6764	0.7969	0.8745	0.9302	0.9569	0.9804
5.00	0.0000	0.2418	0.4108	0.5255	0.6943	0.8081	0.8808	0.9348	0.9589	0.9807
7.50	0.0000	0.2665	0.4337	0.5380	0.7078	0.8162	0.8875	0.9378	0.9626	0.9813
10.00	0.0000	0.2706	0.4500	0.5451	0.7190	0.8216	0.8911	0.9424	0.9640	0.9822
15.00	0.0000	0.2994	0.4735	0.5576	0.7302	0.8343	0.8963	0.9464	0.9670	0.9831
20.00	0.0000	0.3241	0.4898	0.5665	0.7414	0.8397	0.9015	0.9494	0.9691	0.9831
25.00	0.0000	0.3364	0.5034	0.5719	0.7481	0.8419	0.9041	0.9516	0.9701	0.9835
30.00	0.0000	0.3528	0.5089	0.5754	0.7481	0.8442	0.9056	0.9516	0.9711	0.9838
35.00	0.0000	0.3569	0.5116	0.5779	0.7548	0.8451	0.9077	0.9531	0.9701	0.9840
40.00	0.0000	0.3611	0.5143	0.5879	0.7571	0.8509	0.9067	0.9558	0.9701	0.9849
50.00	0.0000	0.3631	0.5171	0.5861	0.7571	0.8532	0.9093	0.9558	0.9711	0.9851
60.00	0.0000	0.3652	0.5171	0.5861	0.7593	0.8554	0.9093	0.9561	0.9711	0.9853
70.00	0.0000	0.3652	0.5171	0.5861	0.7593	0.8554	0.9093	0.9561	0.9711	0.9853

TABLE D-25 CALIBRATION DATA FOR OPEN LOOP - STEAM FLOW
RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

21.5 46.0 56.8 50.0 58.5

POINTS FOR ORDINATE

11.6400 4.1130 0.6805 2.6970 0.2973

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	15.18	60.00	-0.27

CONSTANTS FOR CALIBRATION CURVE

A= 18.26977253 B= -0.30893927

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

4.0 46.2 84.8 59.5

POINTS FOR ORDINATE

38.1000 20.1800 5.1830 14.1500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	35.28	60.00	14.73

CONSTANTS FOR CALIBRATION CURVE

A= 39.39437199 B= -0.41112847

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

7.0 30.8 75.5 39.0 79.0 24.5 46.7

POINTS FOR ORDINATE

52.4000 39.3700 15.3500 35.0000 12.9500 43.0900 31.3400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	50.89	60.00	23.64

CONSTANTS FOR CALIBRATION CURVE

A= 56.33830738 B= -0.54501871

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

5.0 24.7 74.5 32.0

POINTS FOR ORDINATE

58.9800 52.5500 34.3300 49.3000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	57.37	60.00	39.54

CONSTANTS FOR CALIBRATION CURVE

A= 60.93287945 B= -0.35661906

ATA FOR CALIBRATION CURVE - TRAY 5

0.1 30.8 42.7 32.0 19.0 2.5

1990.10 0000.54 0000.51 0000.01 0000.01 0000.01 0000.01 0000.01

POINTS FOR CHECK ON EQUATION OF LINE

Y	X	Y	X
40.88	00.00	98.7	00.01

CONSTANTS FOR CALIBRATION CURVE

[illegible]

DATA FOR CALIBRATION CURVE - TRAY 3

PCINTS FOR ABSCISSA

• 11 5.45 7.45 11.

PC 1412 FOR CRDINATE

POINTS FOR CHECK ON EQUATION OF LINE

Y	X	Y	X
10.00	25.37	10.00	25.37

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

2.5 15.7 62.0 29.0

POINTS FOR ORDINATE

75.6000 70.1200 48.9900 65.4500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	72.79	60.00	50.38

CONSTANTS FOR CALIBRATION CURVE

A= 77.27746010 B= -0.44825865

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

7.2 17.5 49.0 21.2 5.8 54.5

POINTS FOR ORDINATE

84.9700 80.5000 66.0200 78.2000 85.1200 63.3900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	83.52	60.00	60.99

CONSTANTS FOR CALIBRATION CURVE

A= 88.02126694 B= -0.45056446

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSISSA

12.5 12.5 62.0 29.5

POINTS FOR ORDINATE

72.6000 70.1500 68.2200 65.4200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	72.79	60.00	60.38

CONSTANTS FOR CALIBRATION CURVE

$A = 1.276694$ $B = -0.000000$

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSISSA

17.5 17.5 42.0 24.5

POINTS FOR ORDINATE

84.2700 81.1500 78.0200 75.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	83.22	61.00	61.22

CONSTANTS FOR CALIBRATION CURVE

$A = 1.0212694$ $B = -0.000000$

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

7.8 12.1 30.0 15.0 16.0

POINTS FOR ORDINATE

91.0200 87.8800 79.2400 87.2000 86.8000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	89.63	60.00	63.72

CONSTANTS FOR CALIBRATION CURVE

A= 94.81213474 B= -0.51817894

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

5.0 11.7 31.0 13.5

POINTS FOR ORDINATE

94.8600 93.2400 87.0400 92.3200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.48	60.00	78.24

CONSTANTS FOR CALIBRATION CURVE

A= 96.52702332 B= -0.30470747

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSCISSA

1.8 12.1 30.0 15.0 16.0

POINTS FOR ORDINATE

91.0500 87.8800 19.2400 87.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	89.63	60.00	78.24

CONSTANTS FOR CALIBRATION CURVE

A = 44.81513474 B = -0.01511111

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

2.0 11.1 31.0 13.2

POINTS FOR ORDINATE

94.8600 93.2400 87.0400 92.3200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.48	60.00	78.24

CONSTANTS FOR CALIBRATION CURVE

A = 44.81513474 B = -0.01511111

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

10.0 15.0 31.3 17.0

POINTS FOR ORDINATE

97.3100 96.0100 92.8900 95.4900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	97.11	60.00	87.00

CONSTANTS FOR CALIBRATION CURVE

A= 99.12818527 B= -0.20208383

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

48.8 51.0 58.5 51.5 56.2 51.5 56.8 60.0 50.6 52.8
60.5

POINTS FOR ORDINATE

98.6800 98.1500 96.7500 97.8700 97.2000 97.8700 97.2400
96.4700 98.1900 97.8700 96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	105.59	60.00	96.49

CONSTANTS FOR CALIBRATION CURVE

A= 107.40858173 B= -0.18195324

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCLSSA

10.0 15.0 21.0 27.0

POINTS FOR ORDINATE

97.3100 96.0100 95.8900 95.4900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	97.11	60.00	97.11

CONSTANTS FOR CALIBRATION CURVE

A = 99.15818527 B = -0.00000000

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCLSSA

10.0 15.0 21.0 27.0

POINTS FOR ORDINATE

96.4700 96.1900 95.8700 95.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	10.29	60.00	96.49

CONSTANTS FOR CALIBRATION CURVE

A = 107.40828173 B = -0.18111111

TABLE D-26 OPEN LOOP - STEAM FLOW - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0						

TRANSIENT DATA - CHART PERCENT

BOTTOM

22.2	28.5	32.2	34.5	36.5	38.0	40.0	41.0	42.5	43.0
44.0	45.5	46.0	46.0						

TRAY 1

5.0	11.2	15.0	18.5	21.0	25.5	30.0	33.5	35.5	36.5
38.5	38.8	39.2	39.5						

TRAY 2

7.5	10.0	13.0	15.0	17.0	20.5	23.0	24.5	26.0	27.5
28.0	28.6	29.2	30.0						

TRAY 3

5.0	8.0	9.5	10.6	12.5	14.5	16.0	17.5	19.0	20.0
21.0	23.0	24.5	24.5						

TRAY 4

2.5	4.5	6.5	7.5	8.5	9.5	10.5	11.5	12.0	12.8
13.5	14.7	15.0	15.5						

TRAY 5

9.0	10.5	12.0	12.5	13.0	13.5	14.2	15.0	15.5	16.0
16.3	17.0	17.3	17.3						

TRAY 6

7.5	8.2	9.2	9.8	10.2	10.5	10.8	11.5	11.7	11.8
11.8	12.0	12.3	12.2						

TRAY 7

5.0	6.5	7.0	8.0	8.5	8.8	9.2	10.0	10.0	10.3
11.0	11.2	11.5	11.5						

TRAY 8

9.0	10.0	11.0	11.8	12.2	12.8	13.2	13.4	13.5	13.8
14.0	14.8	15.0	15.0						

PROD

48.5	48.8	49.0	49.2	49.6	49.8	49.9	50.0	50.0	50.0
50.4	50.8	56.0	50.8						

TABLE D-27 OPEN LOOP - STEAM FLOW - RUN 2

TRANSIENT DATA - WEIGHT FRACTION										
TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.1141	0.3734	0.5225	0.5915	0.7616	0.8397	0.9093	0.9500	0.9731	0.9858
2.50	0.0947	0.3479	0.5089	0.5808	0.7526	0.8329	0.9056	0.9455	0.9711	0.9853
5.00	0.0832	0.3323	0.4925	0.5754	0.7436	0.8261	0.9004	0.9439	0.9691	0.9849
7.50	0.0761	0.3179	0.4816	0.5715	0.7392	0.8239	0.8973	0.9409	0.9674	0.9846
10.00	0.0699	0.3076	0.4707	0.5648	0.7347	0.8216	0.8953	0.9394	0.9666	0.9838
15.00	0.0653	0.2891	0.4517	0.5576	0.7302	0.8194	0.8937	0.9385	0.9654	0.9835
20.00	0.0591	0.2706	0.4380	0.5523	0.7257	0.8162	0.8922	0.9372	0.9646	0.9833
25.00	0.0560	0.2562	0.4299	0.5469	0.7212	0.8126	0.8885	0.9348	0.9642	0.9831
30.00	0.0514	0.2480	0.4217	0.5416	0.7190	0.8104	0.8875	0.9348	0.9640	0.9831
35.00	0.0499	0.2439	0.4135	0.5380	0.7154	0.8081	0.8870	0.9339	0.9634	0.9831
40.00	0.0468	0.2357	0.4108	0.5344	0.7123	0.8068	0.8870	0.9318	0.9630	0.9824
50.00	0.0421	0.2344	0.4075	0.5273	0.7069	0.8036	0.8859	0.9311	0.9614	0.9817
60.00	0.0406	0.2328	0.4042	0.5220	0.7055	0.8023	0.8844	0.9302	0.9610	0.9722
70.00	0.0406	0.2315	0.3999	0.5220	0.7033	0.8023	0.8849	0.9302	0.9610	0.9817

TABLE D-28 CALIBRATION DATA FOR OPEN LOOP - FEED COMPOSITION
RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

55.8 51.5 54.2 58.5 39.5 47.8 57.5

POINTS FOR ORDINATE

0.6636 2.3710 0.4805 0.2973 4.1130 2.6600 0.1508

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.83	60.00	-0.21

CONSTANTS FOR CALIBRATION CURVE

A= 13.03301322 B= -0.22065486

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

79.0 49.0 85.0 88.0 30.5 55.0 89.5

POINTS FOR ORDINATE

7.8290 16.5600 5.6670 4.9950 24.8800 15.8200 4.1130

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	30.98	60.00	14.11

CONSTANTS FOR CALIBRATION CURVE

A= 34.35159206 B= -0.33738896

8.75	8.14	7.98	7.82	7.42	7.17	8.75
------	------	------	------	------	------	------

PC1412 FOR ORDINATE

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

7.28 0.22 2.08 0.88 0. 0.24 0.22

PC14112 FOR CRD14112

POINTS FOR CHECK ON EQUATION OF LINE

Y	X	Y	X
11.41	.	9.08	CC.

CONSTANTS FOR CALIBRATION CURVE

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

79.0 24.5 46.7

POINTS FOR ORDINATE

12.9500 43.0900 31.3400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	51.33	60.00	23.62

CONSTANTS FOR CALIBRATION CURVE

A= 56.87406731 B= -0.55420908

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

67.5 23.2 72.5 90.0 9.0 50.0 96.0

POINTS FOR ORDINATE

37.5200 50.3700 35.5500 29.5800 56.6700 44.7100 28.7300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	55.94	60.00	39.91

CONSTANTS FOR CALIBRATION CURVE

A= 59.14502811 B= -0.32063987

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

70.0 24.5 46.7

POINTS FOR ORDINATE

15.2500 45.0000 31.1410

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	51.33	60.00	53.6

CONSTANTS FOR CALIBRATION CURVE

A = 0.8746541 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

61.5 23.2 75.5 20.0 20.0 20.0 20.0

POINTS FOR ORDINATE

37.0000 41.0000 45.0000 50.0000 55.0000 60.0000 65.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	52.94	60.00	39.91

CONSTANTS FOR CALIBRATION CURVE

A = 0.14502811 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

2.5 15.7 62.0 24.0 50.0 20.5 57.0 76.0 9.5 28.5
79.0

POINTS FOR ORDINATE

75.6000 70.1200 48.9900 65.4500 54.7100 67.3200 51.0700
44.7100 71.8500 62.4500 42.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	71.70	60.00	50.46

CONSTANTS FOR CALIBRATION CURVE

A= 75.94414806 B= -0.42468951

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

54.5 11.8 23.5

POINTS FOR ORDINATE

63.3900 81.6000 76.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.24	60.00	61.01

CONSTANTS FOR CALIBRATION CURVE

A= 86.48336506 B= -0.42461132

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

POINTS FOR ORIGINATE

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	11.70	60.00	50.40

CONSTANTS FOR CALIBRATION CURVE

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

POINTS FOR ORIGINATE

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	11.70	60.00	50.40

CONSTANTS FOR CALIBRATION CURVE

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

44.5 14.5 23.5

POINTS FOR ORDINATE

77.3300 88.4000 85.2300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	90.13	60.00	71.62

CONSTANTS FOR CALIBRATION CURVE

A= 93.83588409 B= -0.37027454

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

29.0 7.0 8.5

POINTS FOR ORDINATE

87.0600 92.9200 91.6300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	91.73	60.00	79.35

CONSTANTS FOR CALIBRATION CURVE

A= 94.21088028 B= -0.24769992

DATA FOR CALIBRATION CURVE - TRAY 6

PLATE 12 FOR ASCI 22A

2. 24 2. 24 2. 24

POINTS FOR ORDINATE

17.3360 88.4000 82.5300

POINTS FOR CHECK ON EQUATION 14.11

Y	X	Y	X
.11	80.00	80.13	100.00

CONSTANTS FOR CALIBRATION CURVE

[illegible]

ATA FOR CALIBRATION CURVE - TRAY 1

PI INTS FOR ARSC 122A

52.0 10.5 8.8

POINTS FOR GRADUATE

0030.10 0052.52 0080.58

POINTS FOR CHECK ON EQUATION OF LINE

Y	X	Y	X
08.95	00.00	11.10	00.01

CONSTANTS FOR CALIBRATION CURVE

1957 10.15 - 1958 10.15

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

27.0 9.5 9.8

POINTS FOR ORDINATE

92.7400 95.9400 95.0700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	95.45	60.00	87.45

CONSTANTS FOR CALIBRATION CURVE

A= 97.05236244 B= -0.15998030

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

48.8 51.0 58.5 51.5 56.2 51.5 56.8 60.0 50.6 52.8
60.5

POINTS FOR ORDINATE

98.6800 98.1500 96.7500 97.8700 97.2000 97.8700 97.2400
96.4700 98.1900 97.8700 96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	105.59	60.00	96.49

CONSTANTS FOR CALIBRATION CURVE

A= 107.40858173 B= -0.18195324

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSISSA

27.0

POINTS FOR ORDINATE

92.7400 92.9400 92.0700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.42	6.00	81.42

CONSTANTS FOR CALIBRATION CURVE
A = 97.0238244 B = -0.1298030

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSISSA

60.5

POINTS FOR ORDINATE

92.4700 92.1900 92.3600
92.4700 92.1900 92.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.24	60.00	92.42

CONSTANTS FOR CALIBRATION CURVE
A = 107.4082813 B = -0.1219234

TABLE D-29 OPEN LOOP - FEED COMPOSITION - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0	110.0	120.0	

TRANSIENT DATA - CHART PERCENT

BOTTOM

58.2	58.2	57.0	54.0	51.0	47.7	45.5	44.5	44.5	44.2
43.5	43.5	42.5	42.5	42.2	41.5	41.5	41.5	41.5	

TRAY 1

88.8	86.8	80.5	75.0	70.5	63.5	58.5	54.5	51.0	48.5
46.8	43.0	40.5	37.5	36.8	36.0	35.5	35.5	35.5	

TRAY 2

86.8	80.5	72.5	65.5	60.0	53.0	46.5	46.8	38.0	35.0
33.0	28.5	27.0	25.5	24.8	23.8	23.0	22.0	22.0	

TRAY 3

95.5	75.0	58.5	50.0	43.0	34.0	28.0	22.0	18.8	16.0
14.5	13.8	13.5	13.0	12.8	12.0	11.5	11.8	12.0	

TRAY 4

77.5	73.5	58.5	49.2	43.0	34.0	28.0	23.0	20.5	19.0
17.5	16.0	14.5	13.8	13.0	12.6	12.5	12.5	12.5	

TRAY 5

57.5	55.5	49.0	41.5	36.5	29.5	23.0	21.5	19.0	18.0
16.5	15.5	14.5	14.0	13.8	13.2	13.0	12.8	12.8	

TRAY 6

46.0	45.5	41.5	37.0	33.5	27.5	24.0	21.5	19.5	18.3
16.5	16.2	15.8	15.0	14.8	14.8	14.2	13.8	13.8	

TRAY 7

31.0	31.0	29.5	26.5	23.8	19.0	16.0	14.0	12.5	11.0
10.5	9.5	9.0	8.3	8.0	7.8	7.7	7.3	7.3	

TRAY 8

28.5	28.2	28.0	26.5	24.5	20.8	18.0	16.5	14.5	13.2
13.2	12.5	11.8	11.5	11.0	11.0	10.8	10.8	10.5	

PROD

58.7	58.7	59.0	58.2	57.3	55.4	53.8	52.8	52.5	52.0
51.8	51.5	51.0	50.8	50.8	50.6	50.5	50.5	50.4	

TABLE D-30 OPEN LOOP - FEED COMPOSITION - RUN 1

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0019	0.0439	0.0877	0.2852	0.4303	0.6207	0.7680	0.8653	0.9249	0.9673
2.50	0.0019	0.0507	0.1226	0.3510	0.4473	0.6292	0.7699	0.8653	0.9254	0.9673
5.00	0.0046	0.0719	0.1669	0.4039	0.5110	0.6568	0.7847	0.8690	0.9257	0.9667
7.50	0.0112	0.0905	0.2057	0.4311	0.5505	0.6886	0.8014	0.8765	0.9281	0.9682
10.00	0.0178	0.1057	0.2362	0.4536	0.5768	0.7099	0.8143	0.8832	0.9313	0.9698
15.00	0.0251	0.1293	0.2750	0.4824	0.6150	0.7396	0.8365	0.8950	0.9372	0.9733
20.00	0.0299	0.1461	0.3110	0.5017	0.6405	0.7672	0.8495	0.9025	0.9417	0.9762
25.00	0.0321	0.1596	0.3094	0.5209	0.6618	0.7735	0.8587	0.9074	0.9441	0.9780
30.00	0.0321	0.1714	0.3581	0.5312	0.6724	0.7842	0.8662	0.9111	0.9473	0.9786
35.00	0.0328	0.1799	0.3748	0.5401	0.6788	0.7884	0.8706	0.9149	0.9494	0.9795
40.00	0.0343	0.1856	0.3859	0.5450	0.6851	0.7948	0.8773	0.9161	0.9494	0.9798
50.00	0.0343	0.1984	0.4108	0.5472	0.6915	0.7990	0.8784	0.9186	0.9505	0.9804
60.00	0.0366	0.2069	0.4191	0.5482	0.6979	0.8033	0.8799	0.9198	0.9516	0.9813
70.00	0.0366	0.2170	0.4274	0.5498	0.7008	0.8054	0.8828	0.9215	0.9521	0.9817
80.00	0.0372	0.2194	0.4313	0.5504	0.7042	0.8062	0.8836	0.9223	0.9529	0.9817
90.00	0.0388	0.2221	0.4368	0.5530	0.7059	0.8088	0.8836	0.9228	0.9529	0.9820
100.00	0.0388	0.2237	0.4413	0.5546	0.7064	0.8096	0.8858	0.9230	0.9532	0.9822
110.00	0.0388	0.2237	0.4468	0.5536	0.7064	0.8105	0.8873	0.9240	0.9532	0.9822
120.00	0.0388	0.2237	0.4468	0.5530	0.7064	0.8105	0.8873	0.9240	0.9537	0.9824

TABLE D-31 CALIBRATION DATA FOR OPEN LOOP - FEED COMPOSITION
RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

55.8 44.5 54.2

POINTS FOR ORDINATE

0.6636 2.3710 0.8805

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	7.61	60.00	0.01

CONSTANTS FOR CALIBRATION CURVE

A= 9.13276672 B= -0.15199482

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

79.0 49.0 85.0

POINTS FOR ORDINATE

6.8290 15.5600 5.6670

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	26.43	60.00	12.43

CONSTANTS FOR CALIBRATION CURVE

A= 29.23486090 B= -0.28004029

TABLE D-31 CALIBRATION DATA FOR OPEN LOOP - FUEL COMPOSITION

DATA FOR CALIBRATION CURVE - BETH			
POINTS FOR ABSCESSA		POINTS FOR ORDINATE	
12.8	44.5	44.5	54.5
0.6636	5.3710	0.6801	
POINTS FOR CHECK ON EQUATION OF LINE			
X	Y	X	Y
10.00	4.61	60.00	0.01
CONSTANTS FOR CALIBRATION CURVE			
-0.151			

DATA FOR CALIBRATION CURVE - TRAY 1			
POINTS FOR ABSCESSA		POINTS FOR ORDINATE	
79.0	49.0	85.0	
6.8290	1.5600	5.6670	
POINTS FOR CHECK ON EQUATION OF LINE			
X	Y	X	Y
10.00	56.43	60.00	15.44
CONSTANTS FOR CALIBRATION CURVE			
-0.23486090			

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

57.5 29.5 61.5

POINTS FOR ORDINATE

19.8200 34.7200 18.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	44.78	60.00	18.87

CONSTANTS FOR CALIBRATION CURVE

A= 49.96214390 B= -0.51815780

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

67.5 23.2 72.5

POINTS FOR ORDINATE

37.5200 50.3700 35.5500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	54.31	60.00	39.49

CONSTANTS FOR CALIBRATION CURVE

A= 57.27380085 B= -0.29645468

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

27.2 22.2 61.

POINTS FOR ORDINATE

12.82CC 34.12CC 18.400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	44.78	10.00	18.87

CONSTANTS FOR CALIBRATION CURVE

$R = 0.99999$ $R^2 = 0.99998$

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

67.2 23.2 19.2

POINTS FOR ORDINATE

37.22CC 20.37CC 32.2200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	24.31	60.00	32.49

CONSTANTS FOR CALIBRATION CURVE

$R = 0.99999$ $R^2 = 0.99998$

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

2.5 15.7 62.0 24.0 50.0 20.5 57.0 76.0 9.5 28.5
79.0

POINTS FOR ORDINATE

75.6000 70.1200 48.9900 65.4500 54.7100 67.3200 51.0700
44.7100 71.8500 62.4500 42.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	71.70	60.00	50.46

CONSTANTS FOR CALIBRATION CURVE

A= 75.94414806 B= -0.42468951

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

37.0 16.2 40.0

POINTS FOR ORDINATE

70.0300 79.3200 68.5200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.13	60.00	59.57

CONSTANTS FOR CALIBRATION CURVE

A= 86.63926125 B= -0.45115650

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSISSA

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

POINTS FOR ORDINATE

10.0000 11.8500 13.8000 15.8500 17.9000 19.9500 22.0000 24.0500 26.1000 28.1500 30.2000 32.2500 34.3000 36.3500 38.4000 40.4500 42.5000 44.5500 46.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.0	10.0	50.0	50.0
20.0	20.0	60.0	60.0
30.0	30.0	70.0	70.0
40.0	40.0	80.0	80.0
50.0	50.0	90.0	90.0

CONSTANTS FOR CALIBRATION CURVE

$a = 0.0000$ $b = 0.0000$

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSISSA

10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

POINTS FOR ORDINATE

10.0000 11.8500 13.8000 15.8500 17.9000 19.9500 22.0000 24.0500 26.1000 28.1500 30.2000 32.2500 34.3000 36.3500 38.4000 40.4500 42.5000 44.5500 46.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.0	10.0	50.0	50.0
20.0	20.0	60.0	60.0
30.0	30.0	70.0	70.0
40.0	40.0	80.0	80.0
50.0	50.0	90.0	90.0

CONSTANTS FOR CALIBRATION CURVE

$a = 0.0000$ $b = 0.0000$

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

30.5 16.0 31.5

POINTS FOR ORDINATE

82.0000 86.8000 81.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	88.80	60.00	72.13

CONSTANTS FOR CALIBRATION CURVE

A= 92.13910198 B= -0.33355516

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

21.0 11.0 22.5 29.0 7.0 13.5 31.0

POINTS FOR ORDINATE

89.4300 92.1800 89.1700 87.0600 92.9200 91.6300 86.7700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.37	60.00	78.97

CONSTANTS FOR CALIBRATION CURVE

A= 95.04721642 B= -0.26792979

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA
30.5 16.0 31.5

POINTS FOR ORDINATE
.0000 86.8000 81.

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	88.80	60.00	12.13

CONSTANTS FOR CALIBRATION CURVE
SLOPE = 0.0000000000
INTERCEPT = 0.0000000000

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA
21.0 11.0 22.5 29.0 1.0 13.5 31.

POINTS FOR ORDINATE
88.80 87.00 87.00 87.00 87.00 87.00 87.00

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.37	60.00	12.97

CONSTANTS FOR CALIBRATION CURVE
SLOPE = 0.0000000000
INTERCEPT = 0.0000000000

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

26.8 16.0 24.0

POINTS FOR ORDINATE

93.9800 95.4900 93.8100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.33	60.00	88.57

CONSTANTS FOR CALIBRATION CURVE

A= 97.88476849 B= -0.15530401

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

48.8 51.0 58.5 51.5 56.2 51.5 56.8 60.0 50.6 52.8
60.5

POINTS FOR ORDINATE

98.6800 98.1500 96.7500 97.8700 97.2000 97.8700 97.2400
96.4700 98.1900 97.8700 96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	105.59	60.00	96.49

CONSTANTS FOR CALIBRATION CURVE

A= 107.40858173 B= -0.18195324

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

16.0 24.0

POINTS FOR ORDINATE

25.495 23.610

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
16.00	25.33	20.00	28.44

CONSTANTS FOR CALIBRATION CURVE
A = 97.8847849 B = -0.1253401

DATA FOR CALIBRATION CURVE - PRD

POINTS FOR ABSCISSA

60.5

POINTS FOR ORDINATE

25.495 23.610 21.500 21.8100 21.5000 21.8100 21.5000 21.8100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
16.00	25.33	20.00	28.44

CONSTANTS FOR CALIBRATION CURVE
A = 101.408217 B = -0.181022

TABLE D-32 OPEN LOOP - FEED COMPOSITION - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0					

TRANSIENT DATA - CHART PERCENT

BOTTOM

44.2	44.2	44.2	45.5	47.5	51.1	51.5	53.2	53.5	54.0
54.0	54.0	54.2	54.5	54.5					

TRAY 1

46.0	48.5	52.5	56.5	58.5	63.5	68.0	70.5	72.7	73.5
74.5	75.0	75.0	75.0	75.0					

TRAY 2

29.0	30.8	36.5	40.5	43.5	48.5	52.0	55.0	57.5	58.5
59.5	60.0	60.0	60.0	60.0					

TRAY 3

22.5	31.0	38.5	42.5	46.5	51.5	55.0	57.0	60.5	62.5
64.0	66.0	66.0	66.0	66.0					

TRAY 4

20.0	21.0	24.5	27.5	29.5	33.5	37.5	40.5	42.5	45.0
46.5	48.5	48.5	48.5	48.5					

TRAY 5

16.0	16.5	17.5	19.0	20.2	22.5	24.5	27.0	28.8	30.5
31.8	34.0	35.8	36.0	36.5					

TRAY 6

15.8	16.0	16.2	17.0	18.0	19.7	21.0	22.5	23.5	25.0
25.8	27.0	29.5	31.0	31.0					

TRAY 7

10.5	10.5	11.0	11.5	11.5	12.8	14.5	15.0	16.5	17.8
17.8	19.5	20.5	20.8	21.0					

TRAY 8

15.0	15.2	15.2	15.2	15.5	15.7	17.5	18.0	18.8	20.5
21.5	22.0	23.0	24.0	24.0					

PROD

51.5	51.5	51.5	51.5	51.5	52.4	52.8	53.2	53.8	53.4
54.8	55.5	55.7	56.0	56.0					

TABLE D-33 OPEN LOOP - FEED COMPOSITION - RUN 2

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0241	0.1635	0.3494	0.5060	0.6745	0.7942	0.8687	0.9223	0.9556	0.9804
2.50	0.0241	0.1565	0.3400	0.4808	0.6703	0.7920	0.8680	0.9223	0.9552	0.9804
5.00	0.0241	0.1453	0.3105	0.4586	0.6554	0.7874	0.8674	0.9210	0.9552	0.9804
7.50	0.0222	0.1341	0.2898	0.4467	0.6427	0.7807	0.8647	0.9197	0.9552	0.9804
10.00	0.0191	0.1285	0.2742	0.4349	0.6342	0.7753	0.8614	0.9197	0.9548	0.9804
15.00	0.0137	0.1145	0.2483	0.4201	0.6172	0.7649	0.8557	0.9162	0.9545	0.9787
20.00	0.0131	0.1019	0.2302	0.4097	0.6002	0.7559	0.8513	0.9116	0.9517	0.9780
25.00	0.0105	0.0949	0.2146	0.4038	0.5874	0.7446	0.8463	0.9103	0.9509	0.9773
30.00	0.0100	0.0888	0.2017	0.3934	0.5789	0.7365	0.8430	0.9063	0.9497	0.9762
35.00	0.0093	0.0865	0.1965	0.3875	0.5683	0.7288	0.8380	0.9028	0.9470	0.9769
40.00	0.0093	0.0837	0.1913	0.3830	0.5620	0.7229	0.8353	0.9028	0.9455	0.9744
50.00	0.0093	0.0823	0.1887	0.3771	0.5535	0.7130	0.8313	0.8982	0.9447	0.9731
60.00	0.0089	0.0823	0.1887	0.3771	0.5535	0.7049	0.8230	0.8955	0.9431	0.9727
70.00	0.0085	0.0823	0.1887	0.3771	0.5535	0.7040	0.8180	0.8947	0.9416	0.9722
80.00	0.0085	0.0823	0.1887	0.3771	0.5535	0.7017	0.8180	0.8942	0.9416	0.9722

D. Closed Loop Experimental Data

<u>Table</u>	<u>Title</u>
D-34	Calibration Data for Closed Loop - Feed Flow - Run 1
D-35	Closed Loop - Feed Flow - Run 1 Transient Data - Chart Percent
D-36	Closed Loop - Feed Flow - Run 1 Transient Data - Weight Fraction
D-37	Calibration Data for Closed Loop - Feed Flow - Run 2
D-38	Closed Loop - Feed Flow - Run 2 Transient Data - Chart Percent
D-39	Closed Loop - Feed Flow - Run 2 Transient Data - Weight Fraction
D-40	Calibration Data for Closed Loop - Steam Flow - Run 1
D-41	Closed Loop - Steam Flow - Run 1 Transient Data - Chart Percent
D-42	Closed Loop - Steam Flow - Run 1 Transient Data - Weight Fraction
D-43	Calibration Data for Closed Loop - Steam Flow - Run 2
D-44	Closed Loop - Steam Flow - Run 2 Transient Data - Chart Percent
D-45	Closed Loop - Steam Flow - Run 2 Transient Data - Weight Fraction
D-46	Calibration Data for Closed Loop - Comp. Controller Set Pnt. - Run 1
D-47	Closed Loop - Comp. Controller Set Pnt. - Run 1 - Transient Data - Chart Percent
D-48	Closed Loop - Comp. Controller Set Pnt. - Run 1 - Transient Data - Weight Fraction

TableTitle

D-49	Calibration Data for Closed Loop - Comp. Controller Set Pnt. - Run 2
D-50	Closed Loop - Comp. Controller Set Pnt. - Run 2 - Transient Data - Chart Percent
D-51	Closed Loop - Comp. Controller Set Pnt. - Run 2 - Transient Data - Weight Fraction

TABLE D-34 CALIBRATION DATA FOR CLOSED LOOP - FEED FLOW
RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

55.0 50.5 60.0 52.5 58.5 39.5 47.8 57.5

POINTS FOR ORDINATE

0.9200 1.8600 0.2241 1.0440 0.2973 4.1130 2.6600
0.1508

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.12	60.00	-0.09

CONSTANTS FOR CALIBRATION CURVE

A= 12.16080844 B= -0.20417106

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

26.4 11.5 51.5 20.8

POINTS FOR ORDINATE

8.3140 12.8100 2.4290 10.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	13.03	60.00	0.09

CONSTANTS FOR CALIBRATION CURVE

A= 15.61622393 B= -0.25872864

TABLE D-34 CALIBRATION DATA FOR CLOSED LOOP - FIBER FLOW

RUN 1

DATA FOR CALIBRATION CURVE - FIBER FLOW

POINTS FOR ABSCISSA

25.0 20.0 15.0 10.0 5.0 0.0

POINTS FOR ORDINATE

1.0000 0.9999 0.9998 0.9997 0.9996 0.9995

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.0	10.15	60.00	-0.00

CONSTANTS FOR CALIBRATION CURVE

A = 12.1608084 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

25.0 11.5 51.5 20.0

POINTS FOR ORDINATE

12.8100 12.8100 12.8100 12.8100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.0	13.03	60.00	0.00

CONSTANTS FOR CALIBRATION CURVE

A = 12.6162393 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

31.5 15.5 57.0 25.0

POINTS FOR ORDINATE

23.2300 31.0900 8.5760 24.7800

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	33.81	60.00	7.09

CONSTANTS FOR CALIBRATION CURVE

A= 39.15009165 B= -0.53429743

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

34.5 15.5 86.5 30.5

POINTS FOR ORDINATE

41.6400 47.3400 23.5200 43.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	49.74	60.00	32.71

CONSTANTS FOR CALIBRATION CURVE

A= 53.14480400 B= -0.34065399

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSISSA

31.5 15.5 27.0 22.0

POINTS FOR ORDINATE

23.2300 31.0000 27.60 24.1

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	33.81	60.00	7.00

CONSTANTS FOR CALIBRATION CURVE

A = 0.1480400 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSISSA

34.5 15.5 86.5 30.5

POINTS FOR ORDINATE

41.6400 47.3400 23.2200 43.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	49.74	60.00	32.71

CONSTANTS FOR CALIBRATION CURVE

A = 0.14480400 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

19.2 7.0 81.0 14.0

POINTS FOR ORDINATE

58.6100 64.8400 33.3500 59.5000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.42	60.00	41.86

CONSTANTS FOR CALIBRATION CURVE

A= 66.53618145 B= -0.41126011

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

29.0 19.0 75.0 28.0 54.5 11.8 23.0 57.5

POINTS FOR ORDINATE

74.7000 78.0900 52.3000 74.6400 63.3900 81.6000 76.3333
61.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.64	60.00	59.92

CONSTANTS FOR CALIBRATION CURVE

A= 87.18699741 B= -0.45444144

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSCISSA
19.5 1.0 81.0 14.0

POINTS FOR ORDINATE
58.6100 64.8400 31.3400 24.2400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
14.0	41.4	60.0	41.4

CONSTANTS FOR CALIBRATION CURVE
A = 0.0000000000 B = 0.0000000000

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSCISSA
29.0 19.0 75.0 24.0 11.8 23.0 0.0

POINTS FOR ORDINATE
61.1100 58.0000 74.8400 63.3900 81.0000 74.8400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.04	6.00	29.92

CONSTANTS FOR CALIBRATION CURVE
A = 87.1869741 B = 0.0000000000

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

25.5 16.0 61.0 21.5 44.5 14.5 23.0 47.2

POINTS FOR ORDINATE

83.5800 86.0200 70.2400 84.5200 77.3330 88.4000 85.2300
76.4500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	89.26	60.00	71.28

CONSTANTS FOR CALIBRATION CURVE

A= 92.85053253 B= -0.35952316

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

17.2 11.2 43.5 16.1 29.0 7.0 13.5 31.0

POINTS FOR ORDINATE

90.0600 92.0000 83.6600 91.1200 87.0600 92.9200 91.6300
86.7700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.30	60.00	79.21

CONSTANTS FOR CALIBRATION CURVE

A= 94.91427231 B= -0.26168659

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0

POINTS FOR ORDINATE

86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	86.75	20.00	86.75

CONSTANTS FOR CALIBRATION CURVE

86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0

POINTS FOR ORDINATE

86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	86.75	20.00	86.75

CONSTANTS FOR CALIBRATION CURVE

86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500 86.7500

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

19.2 13.5 37.0 15.6 27.0 9.5 14.8 29.0

POINTS FOR ORDINATE

94.3300 95.2800 90.6800 94.7900 92.7400 96.6600 95.0700
92.1400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.18	60.00	85.82

CONSTANTS FOR CALIBRATION CURVE

A= 98.24986744 B= -0.20717970

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

54.8 51.5 64.5 51.2 60.0 50.6 52.8 60.5

POINTS FOR ORDINATE

97.3800 97.8700 95.6200 97.7700 96.4700 98.1900 97.8700
96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	105.19	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A= 106.94264317 B= -0.17495215

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA
10.2 11.5 12.8 14.1 15.4 16.7 18.0 19.3 20.6 21.9 23.2 24.5 25.8 27.1 28.4 29.7 31.0 32.3 33.6 34.9 36.2 37.5 38.8 40.1 41.4 42.7 44.0 45.3 46.6 47.9 49.2 50.5 51.8 53.1 54.4 55.7 57.0 58.3 59.6 60.9 62.2 63.5 64.8 66.1 67.4 68.7 70.0 71.3 72.6 73.9 75.2 76.5 77.8 79.1 80.4 81.7 83.0 84.3 85.6 86.9 88.2 89.5 90.8 92.1 93.4 94.7 96.0 97.3 98.6 99.9

POINTS FOR ORDINATE
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	00.18	60.00	80.82

CONSTANTS FOR CALIBRATION CURVE
SLOPE = 0.001791
INTERCEPT = 0.000000

DATA FOR CALIBRATION CURVE - TRAY 9

POINTS FOR ABSCISSA
24.8 25.1 25.4 25.7 26.0 26.3 26.6 26.9 27.2 27.5 27.8 28.1 28.4 28.7 29.0 29.3 29.6 29.9 30.2 30.5 30.8 31.1 31.4 31.7 32.0 32.3 32.6 32.9 33.2 33.5 33.8 34.1 34.4 34.7 35.0 35.3 35.6 35.9 36.2 36.5 36.8 37.1 37.4 37.7 38.0 38.3 38.6 38.9 39.2 39.5 39.8 40.1 40.4 40.7 41.0 41.3 41.6 41.9 42.2 42.5 42.8 43.1 43.4 43.7 44.0 44.3 44.6 44.9 45.2 45.5 45.8 46.1 46.4 46.7 47.0 47.3 47.6 47.9 48.2 48.5 48.8 49.1 49.4 49.7 50.0 50.3 50.6 50.9 51.2 51.5 51.8 52.1 52.4 52.7 53.0 53.3 53.6 53.9 54.2 54.5 54.8 55.1 55.4 55.7 56.0 56.3 56.6 56.9 57.2 57.5 57.8 58.1 58.4 58.7 59.0 59.3 59.6 59.9 60.2 60.5 60.8 61.1 61.4 61.7 62.0 62.3 62.6 62.9 63.2 63.5 63.8 64.1 64.4 64.7 65.0 65.3 65.6 65.9 66.2 66.5 66.8 67.1 67.4 67.7 68.0 68.3 68.6 68.9 69.2 69.5 69.8 70.1 70.4 70.7 71.0 71.3 71.6 71.9 72.2 72.5 72.8 73.1 73.4 73.7 74.0 74.3 74.6 74.9 75.2 75.5 75.8 76.1 76.4 76.7 77.0 77.3 77.6 77.9 78.2 78.5 78.8 79.1 79.4 79.7 80.0 80.3 80.6 80.9 81.2 81.5 81.8 82.1 82.4 82.7 83.0 83.3 83.6 83.9 84.2 84.5 84.8 85.1 85.4 85.7 86.0 86.3 86.6 86.9 87.2 87.5 87.8 88.1 88.4 88.7 89.0 89.3 89.6 89.9 90.2 90.5 90.8 91.1 91.4 91.7 92.0 92.3 92.6 92.9 93.2 93.5 93.8 94.1 94.4 94.7 95.0 95.3 95.6 95.9 96.2 96.5 96.8 97.1 97.4 97.7 98.0 98.3 98.6 98.9 99.2 99.5 99.8 100.0

POINTS FOR ORDINATE
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59 0.60 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74 0.75 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89 0.90 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	00.19	60.00	80.81

CONSTANTS FOR CALIBRATION CURVE
SLOPE = 0.001791
INTERCEPT = 0.000000

TABLE D-35 CLOSED LOOP - FEED FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0					

TRANSIENT DATA - CHART PERCENT

BOTTOM

54.0	54.5	56.2	57.8	59.0	61.0	61.0	59.5	56.2	55.0
55.0	56.8	56.0	55.5	55.6					

TRAY 1

26.0	27.5	29.0	37.0	42.5	45.0	40.5	41.8	36.5	35.0
38.0	43.0	37.2	35.0	35.0					

TRAY 2

29.5	32.0	35.0	38.8	42.8	47.8	48.5	45.0	40.0	38.5
40.0	44.0	41.0	40.5	42.0					

TRAY 3

34.5	37.0	41.5	46.0	53.8	60.5	62.0	57.0	48.5	45.8
46.5	53.5	48.8	48.5	50.0					

TRAY 4

17.8	19.8	23.8	27.5	32.2	39.5	43.5	37.5	28.0	25.0
26.5	33.0	28.5	27.5	27.5					

TRAY 5

26.0	26.0	28.2	30.8	33.8	37.5	40.2	37.5	31.0	28.8
30.0	34.0	31.0	30.0	31.0					

TRAY 6

23.5	23.5	24.2	26.5	28.0	30.2	30.0	28.8	25.0	23.5
25.0	27.0	25.0	24.5	25.2					

TRAY 7

17.8	17.8	18.0	19.5	21.0	21.8	21.5	20.5	27.5	26.2
17.5	18.5	17.2	17.5	17.5					

TRAY 8

16.5	16.7	17.2	18.0	18.5	19.2	18.8	18.0	16.2	15.8
16.2	17.2	16.3	16.0	16.5					

PROD

52.5	52.5	52.7	52.9	53.0	53.6	53.7	53.3	52.6	52.0
53.0	53.6	53.4	53.4	53.5					

TABLE D-35 CLOSED LOOP - 1000 FLL - WIND 1

DATA READ AT THE FOLLOWING TIMES - MINUTE

0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0
-----	-----	------	------	------	------	------	------

TRANSIENT TIME - PERCENT

BOTTOM							
54.0	56.5	57.8	57.0	61.0	60.5	55.0	55.0
54.0	56.0	57.0	52.0				
TRAY 1							
38.0	41.0	42.0	42.0	42.0	41.8	36.0	36.0
38.0	41.0	42.0	32.0				
TRAY 2							
39.0	41.0	41.0	36.0	47.0	40.0	40.0	38.0
39.0	41.0	41.0	42.0				
TRAY 3							
40.0	41.0	41.0	38.0	40.0	37.0	38.0	42.0
40.0	41.0	41.0	42.0				
TRAY 4							
40.0	41.0	41.0	37.0	37.0	41.0	37.0	37.0
40.0	41.0	41.0	32.0				
TRAY 5							
30.0	31.0	31.0	30.0	33.0	37.0	31.0	38.0
30.0	31.0	31.0	31.0				
TRAY 6							
23.0	24.0	24.0	24.0	28.0	30.0	22.0	22.0
23.0	24.0	24.0	24.0				
TRAY 7							
17.0	17.0	17.0	17.0	21.0	21.0	17.0	17.0
17.0	17.0	17.0	17.0				
TRAY 8							
16.0	16.0	16.0	16.0	18.0	18.0	16.0	16.0
16.0	16.0	16.0	16.0				
PROJ							
23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
23.0	23.0	23.0	23.0				

TABLE D-36 CLOSED LOOP - FEED FLOW - RUN 1

TRANSIENT DATA - WEIGHT FRACTION									
TIME	BTICMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8 PRODUCT
0.00	0.0114	0.0889	0.2339	0.4139	0.5922	0.7537	0.8440	0.9026	0.9483 0.9776
2.50	0.0103	0.0850	0.2205	0.4054	0.5839	0.7537	0.8440	0.9026	0.9479 0.9776
5.00	0.0069	0.0811	0.2045	0.3901	0.5675	0.7437	0.8415	0.9020	0.9469 0.9772
7.50	0.0036	0.0604	0.1842	0.3747	0.5523	0.7319	0.8332	0.8981	0.9452 0.9769
10.00	0.0011	0.0462	0.1628	0.3482	0.5329	0.7183	0.8278	0.8942	0.9442 0.9767
15.00	-0.0029	0.0397	0.1361	0.3254	0.5029	0.7015	0.8199	0.8921	0.9427 0.9757
20.00	-0.0029	0.0514	0.1324	0.3202	0.4865	0.6892	0.8206	0.8929	0.9435 0.9755
25.00	0.0001	0.0480	0.1511	0.3373	0.5111	0.7015	0.8250	0.8955	0.9452 0.9762
30.00	0.0069	0.0617	0.1778	0.3662	0.5502	0.7310	0.8386	0.8772	0.9489 0.9774
35.00	0.0093	0.0656	0.1858	0.3754	0.5625	0.7410	0.8440	0.8806	0.9498 0.9785
40.00	0.0093	0.0578	0.1778	0.3730	0.5564	0.7355	0.8386	0.9033	0.9489 0.9767
50.00	0.0056	0.0449	0.1564	0.3492	0.5296	0.7174	0.8314	0.9007	0.9469 0.9757
60.00	0.0073	0.0599	0.1724	0.3652	0.5482	0.7310	0.8386	0.9041	0.9487 0.9760
70.00	0.0083	0.0656	0.1751	0.3662	0.5523	0.7355	0.8404	0.9033	0.9493 0.9760
80.00	0.0081	0.0656	0.1671	0.3611	0.5523	0.7310	0.8379	0.9033	0.9483 0.9758

TABLE D-37 CALIBRATION DATA FOR CLOSED LOOP - FEED FLOW
RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

55.0 50.5 60.0 52.5 58.5 39.5 47.8 57.5

POINTS FOR ORDINATE

0.9200 1.8600 0.2241 1.0440 0.2973 4.1130 2.6600
0.1508

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	10.12	60.00	-0.09

CONSTANTS FOR CALIBRATION CURVE

A= 12.16080844 B= -0.20417106

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

26.4 11.5 51.5 20.8

POINTS FOR ORDINATE

8.3140 12.8100 2.4290 10.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	13.03	60.00	0.09

CONSTANTS FOR CALIBRATION CURVE

A= 15.61622393 B= -0.25872864

TABLE D-37 CALIBRATION DATA FOR CLOSED LOOP - THE

RUN 2

DATA FOR CALIBRATION CURVE - RTT

POINTS FOR ABSCISSA

55.0 50.5 45.0 40.5 35.0 30.5 25.0 20.5 15.0 10.5 5.0 0.0

POINTS FOR ORDINATE

0.1508 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y
10.00 10.15 6.00 -0.09

CONSTANTS FOR CALIBRATION CURVE

12.16080844 R = -0.204111

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

56.4 51.5 46.5 41.5 36.5 31.5 26.5 21.5 16.5 11.5 6.5 1.5

POINTS FOR ORDINATE

8.3140 12.8100 2.4500 10.4000

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y
10.00 13.03 60.00 0.00

CONSTANTS FOR CALIBRATION CURVE

12.61622394 R = -0.204111

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

30.5 15.5 57.0 25.0

POINTS FOR ORDINATE

23.2300 31.0900 8.5760 24.7800

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	33.68	60.00	6.96

CONSTANTS FOR CALIBRATION CURVE

A= 39.02019024 B= -0.53441221

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

34.5 15.5 86.5 30.5

POINTS FOR ORDINATE

40.6400 47.3400 23.5200 43.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	49.41	60.00	32.50

CONSTANTS FOR CALIBRATION CURVE

A= 52.78936672 B= -0.33812855

DATA FOR CALIBRATION CURVE - TRY 2

POINTS FOR ABSISSA

30.5 15.5 25.0

POINTS FOR ORDINATE

23.2300 31.0000 8.5500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	33.68	60.00	6.98

CONSTANTS FOR CALIBRATION CURVE
a = 0.000000 b = -0.344121

DATA FOR CALIBRATION CURVE - TRY 3

POINTS FOR ABSISSA

34.5 15.5 86.5 30.5

POINTS FOR ORDINATE

40.6400 41.3400 23.5200 43.1900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	49.41	60.00	35.20

CONSTANTS FOR CALIBRATION CURVE
a = 0.000000 b = -0.344121

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

19.2 7.0 81.0 14.0

POINTS FOR ORDINATE

58.6100 64.8400 33.3500 59.5000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.42	60.00	41.86

CONSTANTS FOR CALIBRATION CURVE

A= 66.53618145 B= -0.41126011

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

29.0 19.0 75.0 28.0 54.5 11.8 23.0 57.5

POINTS FOR ORDINATE

74.7000 78.0900 52.3000 74.6400 63.3900 81.6000 76.3333
61.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	82.64	60.00	59.92

CONSTANTS FOR CALIBRATION CURVE

A= 87.18699741 B= -0.45444144

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSCISSA

19.2 7.0 81.0 14.0

POINTS FOR ORDINATE

8.6100 64.8400 33.3500 24.2000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	62.42	60.00	41.00

CONSTANTS FOR CALIBRATION CURVE
A = .3361814 B = -.4126011

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSCISSA

29.0 19.0 75.0 14.0 24.2 11.8 23.0 21.2

POINTS FOR ORDINATE

74.7000 78.0900 52.3000 74.6400 63.3900 81.0000 62.4200 52.4200
61.1100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	82.64	60.00	29.25

CONSTANTS FOR CALIBRATION CURVE
A = .1869241 B = -.4126011

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

25.5 16.0 61.0 21.5 44.5 14.5 23.0 47.2

POINTS FOR ORDINATE

83.5800 86.0200 70.2400 84.5200 77.3330 88.4000 85.2300
76.4500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	89.26	60.00	71.28

CONSTANTS FOR CALIBRATION CURVE

A= 92.85053253 B= -0.35952316

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

17.2 11.2 43.5 16.1 29.0 7.0 13.5 31.0

POINTS FOR ORDINATE

90.0600 92.0000 83.6600 91.1200 87.0600 92.9200 91.6300
86.7700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	92.30	60.00	79.21

CONSTANTS FOR CALIBRATION CURVE

A= 94.91427231 B= -0.26168659

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA
22.5 16.0 61.0 21.5 44.5 16.5 24.0 47.5

POINTS FOR ORDINATE
76.4500 76.4500 76.4500 76.4500 76.4500 76.4500 76.4500 76.4500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
1.00	89.26	60.00	71.2

CONSTANTS FOR CALIBRATION CURVE
A = 92.8203253 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA
17.2 11.2 43.5 16.1 29.0 4.0 13.5 31.0

POINTS FOR ORDINATE
86.1700 86.1700 86.1700 86.1700 86.1700 86.1700 86.1700 86.1700

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	48.30	60.00	71.21

CONSTANTS FOR CALIBRATION CURVE
A = 94.9142731 B = -0.0000000

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

19.2 13.5 37.0 15.6 27.0 9.5 14.8 29.0

POINTS FOR ORDINATE

94.3300 95.2800 90.6800 94.7900 92.7400 96.6600 95.0700
92.1400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	96.18	60.00	85.82

CONSTANTS FOR CALIBRATION CURVE

A= 98.24986744 B= -0.20717970

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

50.8 51.5 64.5 51.2 60.0 50.6 52.8 60.5

POINTS FOR ORDINATE

97.3800 97.8700 95.6200 97.7700 96.4700 98.1900 97.8700
96.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	104.47	60.00	96.43

CONSTANTS FOR CALIBRATION CURVE

A= 106.07759857 B= -0.16087532

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

19.2 13.2 37.0 15.6 27.0 14.1 20.1

POINTS FOR ORDINATE

24.3800 25.4800 26.5800 27.6800 28.7800 29.8800 30.9800

25.1400

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y

10.00 24.18 60.00 82.82

CONSTANTS FOR CALIBRATION CURVE

A = 2.54880144 B = -0.201111

DATA FOR CALIBRATION CURVE - PRPD

POINTS FOR ABSCISSA

20.8 21.2 21.6 22.0 22.4 22.8 23.2

POINTS FOR ORDINATE

27.3800 27.8800 28.3800 28.8800 29.3800 29.8800 30.3800

27.3800

POINTS FOR CHECK ON EQUATION OF LINE

X Y X Y

10.00 24.18 60.00 82.82

CONSTANTS FOR CALIBRATION CURVE

A = 106.0729827 B = -0.1603112

TABLE D-38 CLOSED LOOP - FEED FLOW - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0						

TRANSIENT DATA - CHART PERCENT

BOTTOM

55.0	54.5	53.2	52.5	51.0	50.5	50.0	50.2	50.8	51.0
51.8	53.0	54.0	55.5						

TRAY 1

35.8	30.0	27.0	24.5	22.0	22.0	22.3	22.8	23.2	22.5
23.5	23.5	24.5	25.0						

TRAY 2

41.0	37.0	33.0	30.0	28.5	26.5	24.5	25.0	25.8	26.8
27.2	27.0	27.5	30.0						

TRAY 3

49.0	43.5	37.5	33.8	31.0	27.8	27.5	28.2	30.0	31.5
31.8	31.8	32.2	34.5						

TRAY 4

27.2	24.0	19.0	15.5	13.5	11.2	11.5	13.0	15.0	15.5
15.0	15.4	15.8	17.5						

TRAY 5

30.5	29.5	27.0	24.0	23.0	21.7	22.0	23.0	23.3	23.5
24.2	24.0	24.5	26.0						

TRAY 6

24.2	24.0	22.5	20.5	19.8	20.0	20.0	20.5	21.6	22.0
22.2	22.2	22.3	22.7						

TRAY 7

17.0	16.8	15.5	14.5	13.5	13.8	14.8	15.2	15.5	16.2
16.0	16.0	16.2	16.5						

TRAY 8

16.0	16.0	15.0	14.5	14.2	13.8	14.8	15.2	15.7	16.0
16.0	15.8	15.5	16.2						

PROD

52.5	52.5	52.5	52.3	52.0	51.5	51.5	51.7	52.2	52.5
52.5	52.5	52.5	52.5						

TABLE D-39 CLOSED LOOP - FEED FLOW - RUN 2

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOITCMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0093	0.0635	0.1711	0.3622	0.5535	0.7333	0.8415	0.9047	0.9493	0.9763
2.50	0.0103	0.0785	0.1925	0.3808	0.5667	0.7378	0.8422	0.9052	0.9493	0.9763
5.00	0.0130	0.0863	0.2138	0.4011	0.5872	0.7492	0.8476	0.9086	0.9514	0.9763
7.50	0.0144	0.0928	0.2299	0.4136	0.6016	0.7628	0.8548	0.9112	0.9525	0.9766
10.00	0.0175	0.0992	0.2379	0.4231	0.6098	0.7673	0.8573	0.9138	0.9531	0.9771
15.00	0.0185	0.0992	0.2486	0.4339	0.6193	0.7733	0.8566	0.9130	0.9539	0.9779
20.00	0.0195	0.0985	0.2593	0.4349	0.6181	0.7719	0.8566	0.9104	0.9518	0.9779
25.00	0.0191	0.0972	0.2566	0.4325	0.6119	0.7673	0.8548	0.9094	0.9510	0.9776
30.00	0.0179	0.0961	0.2523	0.4265	0.6037	0.7660	0.8508	0.9086	0.9500	0.9768
35.00	0.0175	0.0979	0.2470	0.4214	0.6016	0.7651	0.8494	0.9067	0.9493	0.9763
40.00	0.0158	0.0954	0.2448	0.4204	0.6037	0.7619	0.8487	0.9073	0.9493	0.9763
50.00	0.0134	0.0954	0.2459	0.4204	0.6020	0.7628	0.8487	0.9073	0.9498	0.9763
60.00	0.0114	0.0928	0.2432	0.4190	0.6004	0.7605	0.8483	0.9067	0.9504	0.9763
70.00	0.0083	0.0915	0.2299	0.4112	0.5934	0.7537	0.8469	0.9060	0.9489	0.9763

TABLE D-40 CALIBRATION DATA FOR CLOSED LOOP - STEAM FLOW
RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

94.0 80.0 58.0 84.0 34.0

POINTS FOR ORDINATE

1.6970 4.1720 8.0530 3.1810 13.4400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.88	60.00	8.07

CONSTANTS FOR CALIBRATION CURVE

A= 19.83895540 B= -0.19614793

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

101.0 72.0 32.0 73.0 10.0 23.0

POINTS FOR ORDINATE

12.2500 19.6800 31.1500 19.4000 37.4000 34.7600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	37.66	60.00	23.45

CONSTANTS FOR CALIBRATION CURVE

A= 40.49994230 B= -0.28411463

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSISSA

10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0

POINTS FOR ORDINATE

1.6270 4.1750 8.6530 3.1810 13.4400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y
10.00	11.88
6.00	6.00
0.00	0.00

CONSTANTS FOR CALIBRATION CURVE

11.000000 0.000000

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSISSA

10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0

POINTS FOR ORDINATE

11.2500 12.6800 31.0000 11.4000 11.0000 10.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y
10.00	37.66
60.00	23.42
0.00	0.00

CONSTANTS FOR CALIBRATION CURVE

11.000000 0.000000

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

95.0 70.0 46.0 68.0 34.0

POINTS FOR ORDINATE

28.1900 38.0500 47.8100 39.0300 52.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.21	60.00	42.18

CONSTANTS FOR CALIBRATION CURVE

A= 66.21641445 B= -0.40064561

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

90.0 72.0 55.5 67.0 50.0

POINTS FOR ORDINATE

44.7100 50.0600 55.9100 51.4600 57.6200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.50	60.00	54.20

CONSTANTS FOR CALIBRATION CURVE

A= 73.76027870 B= -0.32598326

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA
35.0 70.0 45.0 68.0 34.0

POINTS FOR ORDINATE
34.1000 35.0500 47.8100 34.1000 35.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.21	60.00	42.18

CONSTANTS FOR CALIBRATION CURVE
A = 66.2161445 B = -0.4064581

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA
20.0 75.0 52.5 67.0 20.0

POINTS FOR ORDINATE
44.7100 52.0000 55.9100 51.8000 44.7100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.50	60.00	54.2

CONSTANTS FOR CALIBRATION CURVE
A = 11.16027870 B = -0.229834

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

90.0 56.0 30.5 45.0 20.0

POINTS FOR ORDINATE

57.3400 64.4000 71.3400 67.6200 73.2900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	75.70	60.00	64.08

CONSTANTS FOR CALIBRATION CURVE

A= 78.02223396 B= -0.23238584

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

94.0 71.0 51.0 60.0 47.0

POINTS FOR ORDINATE

69.2100 74.9600 81.1300 79.0800 82.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.14	60.00	78.75

CONSTANTS FOR CALIBRATION CURVE

A= 96.01772881 B= -0.28779766

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

90.0 26.0 30.0 42.0 50.0

POINTS FOR ORDINATE

21.3400 64.4000 71.3400 61.6200 73.2900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	75.70	60.00	64.00

CONSTANTS FOR CALIBRATION CURVE

A = 1.025334 B = -0.011909

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

94.0 71.0 81.0 60.0 47.0

POINTS FOR ORDINATE

69.2100 74.9600 81.1300 79.0800 82.7200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.14	60.00	78.70

CONSTANTS FOR CALIBRATION CURVE

A = 1.0172881 B = -0.0219744

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

93.5 80.0 72.0 74.0 67.0

POINTS FOR ORDINATE

83.3200 86.2400 88.3200 87.0600 89.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.98	60.00	90.75

CONSTANTS FOR CALIBRATION CURVE

A= 104.22270679 B= -0.22461459

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

94.0 71.0 54.0 58.0 48.0

POINTS FOR ORDINATE

87.2900 90.5400 92.7100 92.2800 93.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.79	60.00	91.97

CONSTANTS FOR CALIBRATION CURVE

A= 100.15437031 B= -0.13646725

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSISSA
93.5 41.0 32.0 24.0 17.0

POINTS FOR ORDINATE
81.330 44.330 35.330 26.330 17.330

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.98	60.00	94.75

CONSTANTS FOR CALIBRATION CURVE
A = 104.2220679 B = -0.2290144

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSISSA
94.0 41.0 32.0 24.0 17.0

POINTS FOR ORDINATE
81.330 44.330 35.330 26.330 17.330

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.79	60.00	91.97

CONSTANTS FOR CALIBRATION CURVE
A = 100.12437031 B = -0.12437031

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

94.0 78.0 65.0 68.0 61.0

POINTS FOR ORDINATE

92.7800 94.8500 95.7300 95.5900 96.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.67	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A= 102.71998405 B= -0.10450800

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

63.0 58.7 51.5 51.0 51.0

POINTS FOR ORDINATE

96.8900 97.6900 98.1500 97.9400 98.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.08	60.00	97.33

CONSTANTS FOR CALIBRATION CURVE

A= 103.03257561 B= -0.09506860

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSISSA

94.0 78.0 62.0 46.0 30.0 14.0

POINTS FOR ORDINATE

95.7800 94.8500 93.9200 92.9900 92.0600 91.1300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y
10.00	101.67
60.00	96.14

CONSTANTS FOR CALIBRATION CURVE

A = 1.032198405 B = -0.00111111

DATA FOR CALIBRATION CURVE - TRAY 9

POINTS FOR ABSISSA

63.0 58.0 53.0 48.0 43.0 38.0

POINTS FOR ORDINATE

97.8800 97.0500 96.2200 95.3900 94.5600 93.7300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y
10.00	102.08
60.00	96.14

CONSTANTS FOR CALIBRATION CURVE

A = 1.032198405 B = -0.00111111

TABLE D-41 CLOSED LOOP - STEAM FLOW - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0				

TRANSIENT DATA - CHART PERCENT

BOTTOM

59.0	70.0	75.5	80.0	83.5	87.0	88.0	87.8	87.8	85.8
83.8	82.8	81.8	81.0	81.8	82.0				

TRAY 1

32.0	45.0	51.5	57.0	62.0	69.0	74.0	75.8	76.2	75.8
74.0	70.0	69.0	68.0	69.0	69.0				

TRAY 2

47.0	53.5	60.0	63.0	67.0	69.0	71.0	72.0	72.0	70.5
69.0	68.0	66.0	66.0	67.0	67.0				

TRAY 3

55.0	57.0	62.0	64.2	66.2	69.0	70.5	72.0	71.6	70.5
69.0	68.0	67.0	67.0	67.0	67.0				

TRAY 4

32.5	35.0	43.5	47.0	48.0	50.0	50.5	50.0	48.0	45.0
44.5	43.0	42.0	42.0	42.0	42.5				

TRAY 5

52.0	54.0	59.8	61.0	62.0	62.0	62.5	61.8	60.5	59.0
57.8	57.0	57.0	57.0	57.0	58.0				

TRAY 6

71.8	72.6	74.3	75.0	76.0	76.0	75.8	75.7	75.6	74.5
74.2	74.0	74.0	73.8	73.8	74.0				

TRAY 7

55.0	57.0	61.0	62.2	62.5	62.5	62.5	62.0	61.0	59.5
58.5	58.0	57.5	57.5	57.7	59.0				

TRAY 8

66.0	68.0	70.8	71.8	71.8	72.0	71.8	71.7	71.0	70.0
59.0	59.0	59.0	59.0	59.0	59.0				

PROD

51.0	51.0	51.5	51.0	51.5	51.5	51.5	51.5	51.5	51.5
51.5	51.0	51.0	51.0	51.0	51.0				

TRAVELING - DATA PERCENT

TABLE D-43 CALIBRATION DATA FOR CLOSED LOOP - STEAM FLOW
RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

94.0 80.0 58.0 84.0 34.0

POINTS FOR ORDINATE

1.6970 4.1720 8.0530 3.1810 13.4400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.88	60.00	8.07

CONSTANTS FOR CALIBRATION CURVE

A= 19.83895540 B= -0.19614793

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

101.0 72.0 32.0 73.0 10.0 23.0

POINTS FOR ORDINATE

12.2500 19.6800 31.1500 19.4000 37.4000 34.7600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	37.66	60.00	23.45

CONSTANTS FOR CALIBRATION CURVE

A= 40.49994230 B= -0.28411463

DATA FOR CALIBRATION CURVE - 1111

POINTS FOR ABSCISSA

94.0 80.0 58.0 34.0

POINTS FOR ORDINATE

1.6970 4.1720 .0530 3.1810 13.4400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.00	10.00	8.00

CONSTANTS FOR CALIBRATION CURVE

A = 15.0000 B = -1.0000

DATA FOR CALIBRATION CURVE - 1111

POINTS FOR ABSCISSA

101.0 75.0 50.0 25.0

POINTS FOR ORDINATE

1.2500 12.6800 31.1500 19.4000 31.4000 34.7000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	37.00	60.00	23.00

CONSTANTS FOR CALIBRATION CURVE

A = 15.0000 B = -1.0000

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

95.0 70.0 46.0 68.0 34.0

POINTS FOR ORDINATE

28.1900 38.0500 47.8100 39.0300 52.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.21	60.00	42.18

CONSTANTS FOR CALIBRATION CURVE

A= 66.21641445 B= -0.40064561

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

90.0 72.0 55.5 67.0 50.0

POINTS FOR ORDINATE

44.7100 50.0600 55.9100 51.4600 57.6200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.50	60.00	54.20

CONSTANTS FOR CALIBRATION CURVE

A= 73.76027870 B= -0.32598326

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA
25.0 70.0 46.0 34.0

POINTS FOR ORDINATE
11.1900 34.0500 47.8100 39.0300 25.6100

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.21	60.00	45.18

CONSTANTS FOR CALIBRATION CURVE
A = 0.216144 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA
20.0 75.0 55.0 45.0

POINTS FOR ORDINATE
44.7100 25.0600 52.9100 51.4600 27.6200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.20	60.00	24.20

CONSTANTS FOR CALIBRATION CURVE
A = 0.2027810 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

90.0 56.0 30.5 45.0 20.0

POINTS FOR ORDINATE

57.3400 64.4000 71.3400 67.6200 73.2900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	75.70	60.00	64.08

CONSTANTS FOR CALIBRATION CURVE

A= 78.02223396 B= -0.23238584

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

94.0 71.0 51.0 60.0 47.0

POINTS FOR ORDINATE

69.2100 74.9600 81.1300 79.0800 82.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.14	60.00	78.75

CONSTANTS FOR CALIBRATION CURVE

A= 96.01772881 B= -0.28779766

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCLSSA
10.0 26.0 30.0 45.0 50.0

POINTS FOR ORDINATE
97.3400 64.4000 41.3400 27.4000 14.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	75.70	60.00	64.00

CONSTANTS FOR CALIBRATION CURVE
A = 1.000000 B = -0.233888

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCLSSA
24.0 41.0 51.0 60.0 47.0

POINTS FOR ORDINATE
62.2100 44.9600 31.1300 19.0800 82.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.14	60.00	46.75

CONSTANTS FOR CALIBRATION CURVE
A = 1.017500 B = -0.281777

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

93.5 80.0 72.0 74.0 67.0

POINTS FOR ORDINATE

83.3200 86.2400 88.3200 87.0600 89.3600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.98	60.00	90.75

CONSTANTS FOR CALIBRATION CURVE

A= 104.22270679 B= -0.22461459

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

94.0 71.0 54.0 58.0 48.0

POINTS FOR ORDINATE

87.2900 90.5400 92.7100 92.2800 93.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.79	60.00	91.97

CONSTANTS FOR CALIBRATION CURVE

A= 100.15437031 B= -0.13646725

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSISSA
93.5 80.0 71.0 64.0 67.0

POINTS FOR ORDINATE
87.2800 86.2500 85.2200 84.1900 83.1600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.9	60.00	81.97

CONSTANTS FOR CALIBRATION CURVE
a = 0.001537011 b = -0.000000000

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSISSA
94.0 71.0 64.0 58.0 48.0

POINTS FOR ORDINATE
87.2800 86.2500 85.2200 84.1900 83.1600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.79	60.00	81.97

CONSTANTS FOR CALIBRATION CURVE
a = 0.001537011 b = -0.000000000

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

94.0 78.0 65.0 68.0 61.0

POINTS FOR ORDINATE

92.7800 94.8500 95.7300 95.5900 96.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.67	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A= 102.71998405 B= -0.10450800

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

63.0 58.7 51.5 51.0 51.0

POINTS FOR ORDINATE

96.8900 97.6900 98.1500 97.9400 98.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.08	60.00	97.33

CONSTANTS FOR CALIBRATION CURVE

A= 103.03257561 B= -0.09506860

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSCISSA

94.0 78.0 65.0 61.0

POINTS FOR ORDINATE

92.00 88.00 84.00 80.00

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.07	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A = 1.033551 B = -0.000000

DATA FOR CALIBRATION CURVE - PRUD

POINTS FOR ABSCISSA

63.0 58.0 51.0 51.0

POINTS FOR ORDINATE

96.000 91.600 88.150 84.000 80.330

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.08	60.00	97.33

CONSTANTS FOR CALIBRATION CURVE

A = 1.033551 B = -0.000000

TABLE D-44 CLOSED LOOP - STEAM FLOW - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0	70.0	80.0	90.0	100.0			

TRANSIENT DATA - CHART PERCENT

BOTTOM

82.0	73.0	64.0	54.0	47.0	37.0	35.0	34.0	34.5	34.5
35.0	35.0	35.5	34.0	34.0	33.8	33.8			

TRAY 1

72.0	56.0	43.0	32.0	25.5	18.0	13.5	11.0	10.5	11.0
9.0	9.0	9.0	9.0	9.0	9.0	9.0			

TRAY 2

68.5	59.0	51.5	45.5	42.0	38.0	37.0	37.0	37.0	36.2
36.0	36.0	35.0	34.0	34.0	34.0	34.0			

TRAY 3

67.0	63.0	57.0	53.5	51.5	49.5	49.5	51.0	52.0	52.0
51.0	50.0	49.5	49.5	49.0	49.0	49.0			

TRAY 4

42.0	35.0	25.0	21.8	19.0	18.5	19.5	20.5	21.0	20.5
20.5	20.5	20.0	19.5	20.0	19.0	19.0			

TRAY 5

57.5	53.0	48.0	45.0	44.0	44.0	44.5	45.5	45.5	45.5
45.5	45.5	45.5	45.0	45.5	45.5	45.0			

TRAY 6

73.0	72.5	69.5	68.0	67.8	67.8	68.0	68.0	68.2	68.2
68.0	68.0	68.0	67.5	67.8	67.5	67.0			

TRAY 7

57.0	53.5	49.5	47.0	46.0	46.5	47.0	48.0	48.2	49.0
49.0	48.5	49.0	48.2	48.0	47.5	48.0			

TRAY 8

68.0	65.5	63.0	61.5	60.0	59.5	60.0	61.0	61.5	61.0
61.5	61.5	61.5	61.0	61.0	60.5	61.0			

PROD

51.0	51.0	50.5	50.2	50.1	50.0	50.3	50.5	50.8	51.0
51.0	51.0	51.2	51.2	51.3	51.0	51.0			

TABLE D-44 CLOSED LOOP - 21 AM 110 - RUN 5

DATA READ AT THE FOLLOWING TIMES - INCH

0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
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TRAY 21 INCH DATA - CHART PERCENT

BOTTOM																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 1																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 2																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 3																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 4																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 5																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 6																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 7																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
TRAY 8																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
PRCD																				
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0
0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	100.0

TABLE D-45 CLOSED LOOP - STEAM FLOW - RUN 2

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTTCMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0375	0.2004	0.3877	0.5192	0.6826	0.7947	0.8783	0.9238	0.9561	0.9818
2.50	0.0552	0.2459	0.4258	0.5322	0.6989	0.8076	0.8794	0.9285	0.9587	0.9818
5.00	0.0729	0.2828	0.4558	0.5518	0.7221	0.8220	0.8861	0.9340	0.9614	0.9823
7.50	0.0925	0.3141	0.4799	0.5632	0.7296	0.8307	0.8895	0.9374	0.9629	0.9826
10.00	0.1062	0.3326	0.4939	0.5697	0.7361	0.8335	0.8899	0.9388	0.9645	0.9827
15.00	0.1258	0.3539	0.5099	0.5762	0.7372	0.8335	0.8899	0.9381	0.9650	0.9828
20.00	0.1297	0.3666	0.5139	0.5762	0.7349	0.8321	0.8895	0.9374	0.9645	0.9825
25.00	0.1317	0.3737	0.5139	0.5714	0.7326	0.8292	0.8895	0.9360	0.9634	0.9823
30.00	0.1307	0.3752	0.5139	0.5681	0.7314	0.8292	0.8890	0.9358	0.9629	0.9820
35.00	0.1307	0.3737	0.5171	0.5681	0.7326	0.8292	0.8890	0.9347	0.9634	0.9818
40.00	0.1297	0.3794	0.5179	0.5714	0.7326	0.8292	0.8895	0.9347	0.9629	0.9818
50.00	0.1297	0.3794	0.5179	0.5746	0.7326	0.8292	0.8895	0.9354	0.9629	0.9818
60.00	0.1288	0.3794	0.5219	0.5762	0.7337	0.8292	0.8895	0.9347	0.9629	0.9817
70.00	0.1317	0.3794	0.5259	0.5762	0.7349	0.8307	0.8906	0.9358	0.9634	0.9817
80.00	0.1317	0.3794	0.5259	0.5779	0.7337	0.8292	0.8899	0.9360	0.9634	0.9816
90.00	0.1321	0.3794	0.5259	0.5779	0.7361	0.8292	0.8906	0.9367	0.9640	0.9818
100.00	0.1321	0.3794	0.5259	0.5779	0.7361	0.8307	0.8917	0.9360	0.9634	0.9818

TABLE D-46 CALIBRATION DATA FOR CLOSED LOOP -
COMP. CONTROLLER SET PNT. - RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

94.0 80.0 58.0 84.0 34.0

POINTS FOR ORDINATE

1.6970 4.1720 8.0530 3.1810 13.4400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.88	60.00	8.07

CONSTANTS FOR CALIBRATION CURVE

A= 19.83895540 B= -0.19614793

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

101.0 72.0 32.0 73.0 10.0 23.0

POINTS FOR ORDINATE

12.2500 19.6800 31.1500 19.4000 37.4000 34.7600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	37.66	60.00	23.45

CONSTANTS FOR CALIBRATION CURVE

A= 40.49994230 B= -0.28411463

COMP. CONTROLLER SET PNT. - RUN 1

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA
24.0 38.0 58.0 84.0 94.0

POINTS FOR ORDINATE

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.88	60.00	1.07

CONSTANTS FOR CALIBRATION CURVE
19.8389540 R = - .1961493

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA
101.0 121.0 132.0 143.0 154.0

POINTS FOR ORDINATE

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	31.00	60.00	13.40

CONSTANTS FOR CALIBRATION CURVE
19.8389540 R = - .1961493

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

95.0 70.0 46.0 68.0 34.0

POINTS FOR ORDINATE

28.1900 38.0500 47.8100 39.0300 52.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.21	60.00	42.18

CONSTANTS FOR CALIBRATION CURVE

A= 66.21641445 B= -0.40064561

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

90.0 72.0 55.5 67.0 50.0

POINTS FOR ORDINATE

44.7100 50.0600 55.9100 51.4600 57.6200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.50	60.00	54.20

CONSTANTS FOR CALIBRATION CURVE

A= 73.76027870 B= -0.32598326

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSE
25.0 70.0 46.0 68.0 34.0

POINTS FOR ORDINATE
24.1000 24.1000 24.1000 24.1000 24.1000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	65.21	60.00	45.1

CONSTANTS FOR CALIBRATION CURVE
A = 0.000000 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSE
20.0 75.0 55.0 67.0 50.0

POINTS FOR ORDINATE
44.7100 50.0600 52.2100 51.4600 57.6500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.20	60.00	54.20

CONSTANTS FOR CALIBRATION CURVE
A = 13.16027870 B = -0.3877112

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

90.0 56.0 30.5 45.0 20.0

POINTS FOR ORDINATE

57.3400 64.4000 71.3400 67.6200 73.2900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	75.70	60.00	64.08

CONSTANTS FOR CALIBRATION CURVE

A= 78.02223396 B= -0.23238584

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

94.0 71.0 51.0 60.0 47.0

POINTS FOR ORDINATE

69.2100 74.9600 81.1300 79.0800 82.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.14	60.00	78.75

CONSTANTS FOR CALIBRATION CURVE

A= 96.01772881 B= -0.28779766

DATA FOR CALIBRATION CURVE - TRAY A

POINTS FOR ABSCISSA
30.0 26.0 30.5 42.0 20.0

POINTS FOR ORDINATE
21.3400 24.4000 21.3400 21.3400 21.3400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	12.70	60.00	64.00

CONSTANTS FOR CALIBRATION CURVE
A = 0.000000 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY B

POINTS FOR ABSCISSA
24.0 21.0 21.0 60.0 47.0

POINTS FOR ORDINATE
22.2100 24.9600 21.1300 22.0800 21.1300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	23.14	60.00	18.70

CONSTANTS FOR CALIBRATION CURVE
A = 0.0172981 B = -0.287707

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

90.0 82.0 72.0

POINTS FOR ORDINATE

81.0000 84.0000 88.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	112.33	60.00	92.72

CONSTANTS FOR CALIBRATION CURVE

A= 116.25005722 B= -0.39221382

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

94.0 71.0 54.0 58.0 48.0

POINTS FOR ORDINATE

87.2900 90.5400 92.7100 92.2800 93.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.79	60.00	91.97

CONSTANTS FOR CALIBRATION CURVE

A= 100.15437031 B= -0.13646725

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA
90.0 85.0 75.0

POINTS FOR ORDINATE
91.0000 84.0000 75.0000

POINTS FOR CHECK ON EQUATION OF LINE

10.00 115.33 60.00 95.75
Y X Y

CONSTANTS FOR CALIBRATION CURVE
A = 116.2500522 B = -0.123111

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA
94.0 71.0 54.0 28.0 48.0

POINTS FOR ORDINATE
87.2900 90.2400 92.7100 92.2800 93.6000

POINTS FOR CHECK ON EQUATION OF LINE

10.00 98.75 60.00 91.75
X Y X Y

CONSTANTS FOR CALIBRATION CURVE
A = 100.1543703 B = -0.118411

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

94.0 78.0 65.0 68.0 61.0

POINTS FOR ORDINATE

92.7800 94.8500 95.7300 95.5900 96.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.67	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A= 102.71998405 B= -0.10450800

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

63.0 58.7 51.5 51.0 51.0

POINTS FOR ORDINATE

96.8900 97.6900 98.1500 97.9400 98.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.08	60.00	97.33

CONSTANTS FOR CALIBRATION CURVE

A= 103.03257561 B= -0.09506860

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSISSA
24.0 78.0 68.0 61.0

POINTS FOR ORDINATE
98.760 94.120 97.120 94.120

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
11.00	101.67	60.00	96.49

CONSTANTS FOR CALIBRATION CURVE

A = 102.7199400 B = -0.171

DATA FOR CALIBRATION CURVE - PRBD

POINTS FOR ABSISSA
63.0 58.7 51.5 51.0

POINTS FOR ORDINATE
96.890 97.650 96.150 97.990

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.08	60.00	97.83

CONSTANTS FOR CALIBRATION CURVE

A = 117.0325261 B = -0.9

TABLE D-47 CLOSED LOOP - COMP. CONTROLLER SET PNT. - RUN 1

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0							

TRANSIENT DATA - CHART PERCENT

BOTTOM

92.0	90.5	86.0	81.0	79.0	77.5	79.6	83.2	81.0	81.0
80.5	80.0	80.0							

TRAY 1

90.0	90.0	79.0	71.5	67.0	66.0	67.0	67.5	66.6	66.0
66.0	65.0	62.0							

TRAY 2

96.0	95.5	87.5	81.5	79.5	73.0	74.5	75.5	73.0	72.0
72.0	72.5	71.0							

TRAY 3

90.0	85.0	78.5	75.5	74.5	73.5	74.0	74.0	74.0	74.0
74.0	73.0	73.0							

TRAY 4

85.5	75.0	64.0	59.0	56.0	55.0	58.0	58.2	58.2	58.1
57.8	56.0	56.0							

TRAY 5

90.0	82.0	74.0	71.0	70.0	69.5	71.5	71.8	71.7	72.0
71.5	70.0	70.0							

TRAY 6

90.0	86.2	81.5	81.0	80.8	81.0	81.8	82.0	81.9	82.0
81.5	80.2	79.8							

TRAY 7

90.0	81.5	75.0	71.5	70.0	71.0	73.5	73.0	73.0	73.0
72.5	72.0	71.8							

TRAY 8

93.0	88.5	83.0	79.8	79.8	80.0	81.0	81.0	81.0	80.8
80.5	79.0	78.0							

PROD

63.0	61.0	60.0	59.0	58.5	58.0	58.2	58.5	58.5	58.5
58.5	58.5	58.5							

TABLE D-48 CLOSED LOOP - CCMP. CONTROLLER SET PNT. - RUN 1

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.C179	0.1493	0.2775	0.4442	0.5815	0.7012	0.8095	0.8787	0.9300	0.9704
2.50	0.C209	0.1493	0.2795	0.4605	0.6059	0.7242	0.8244	0.8903	0.9347	0.9723
5.00	0.C297	0.1805	0.3116	0.4817	0.6315	0.7472	0.8428	0.8992	0.9405	0.9733
7.50	0.C395	0.2019	0.3356	0.4915	0.6431	0.7558	0.8448	0.9040	0.9438	0.9742
10.00	0.C434	0.2146	0.3437	0.4947	0.6501	0.7587	0.8456	0.9060	0.9438	0.9747
15.00	0.C464	0.2175	0.3697	0.4980	0.6524	0.7602	0.8448	0.9047	0.9436	0.9752
20.00	0.C423	0.2146	0.3637	0.4964	0.6454	0.7544	0.8417	0.9012	0.9425	0.9750
25.00	0.C352	0.2132	0.3597	0.4964	0.6450	0.7535	0.8409	0.9019	0.9425	0.9747
30.00	0.C395	0.2158	0.3697	0.4964	0.6450	0.7538	0.8413	0.9019	0.9425	0.9747
35.00	0.C395	0.2175	0.3737	0.4964	0.6452	0.7530	0.8409	0.9019	0.9428	0.9747
40.00	0.C405	0.2175	0.3737	0.4964	0.6459	0.7544	0.8428	0.9026	0.9431	0.9747
50.00	0.C415	0.2203	0.3717	0.4996	0.6501	0.7587	0.8479	0.9033	0.9446	0.9747
60.00	0.C415	0.2288	0.3777	0.4996	0.6501	0.7587	0.8495	0.9036	0.9457	0.9747

TABLE D-49 CALIBRATION DATA FOR CLOSED LOOP -
COMP. CONTROLLER SET PNT. - RUN 2

DATA FOR CALIBRATION CURVE - BOTTOM

POINTS FOR ABSCISSA

94.0 80.0 58.0 84.0 34.0

POINTS FOR ORDINATE

1.6970 4.1720 8.0530 3.1810 13.4400

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.88	60.00	8.07

CONSTANTS FOR CALIBRATION CURVE

A= 19.83895540 B= -0.19614793

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCISSA

101.0 72.0 32.0 73.0 10.0 23.0

POINTS FOR ORDINATE

12.2500 19.6800 31.1500 19.4000 37.4000 34.7600

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	37.66	60.00	23.45

CONSTANTS FOR CALIBRATION CURVE

A= 40.49994230 B= -0.28411463

COMP. CONTROLLER SET POINT - RUN 2

DATA FOR CALIBRATION CURVE - BUTT

POINTS FOR ABSCESSA
94.0 80.0 58.0 34.0

POINTS FOR ORDINATE
1.6970 4.1720 8.2330 13.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	17.88	60.00	8.07

CONSTANTS FOR CALIBRATION CURVE
A = 19.83895240 B = -0.19614793

DATA FOR CALIBRATION CURVE - TRAY 1

POINTS FOR ABSCESSA
101.0 75.0 52.0 10.0 23.0

POINTS FOR ORDINATE
12.2500 12.6800 31.1500 19.4000 34.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	37.66	60.00	23.42

CONSTANTS FOR CALIBRATION CURVE
A = 0.00000000 B = -0.25000000

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSCISSA

95.0 70.0 46.0 68.0 34.0

POINTS FOR ORDINATE

28.1900 38.0500 47.8100 39.0300 52.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	62.21	60.00	42.18

CONSTANTS FOR CALIBRATION CURVE

A= 66.21641445 B= -0.40064561

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSCISSA

90.0 72.0 55.5 67.0 50.0

POINTS FOR ORDINATE

44.7100 50.0600 55.9100 51.4600 57.6200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	70.50	60.00	54.20

CONSTANTS FOR CALIBRATION CURVE

A= 73.76027870 B= -0.32598326

DATA FOR CALIBRATION CURVE - TRAY

MINIMUM ABSISSA
70.0 46.0 6.0 34.0

POINTS FOR ORIGINATE
24.100 11.000 24.100 11.000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	24.10	60.00	24.10

CONSTANTS FOR CALIBRATION CURVE
A = 0.000000 B = 0.000000

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSISSA
70.0 52.5 67.0 50.0

POINTS FOR ORIGINATE
44.7100 50.0000 52.5100 51.4600 57.6200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	50.50	60.00	24.5

CONSTANTS FOR CALIBRATION CURVE
A = 13.76027870 B = 0.000000

DATA FOR CALIBRATION CURVE - TRAY 4

POINTS FOR ABSCISSA

90.0 56.0 30.5 45.0 20.0

POINTS FOR ORDINATE

57.3400 64.4000 71.3400 67.6200 73.2900

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	75.70	60.00	64.08

CONSTANTS FOR CALIBRATION CURVE

A= 78.02223396 B= -0.23238584

DATA FOR CALIBRATION CURVE - TRAY 5

POINTS FOR ABSCISSA

94.0 71.0 51.0 60.0 47.0

POINTS FOR ORDINATE

69.2100 74.9600 81.1300 79.0800 82.7500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	93.14	60.00	78.75

CONSTANTS FOR CALIBRATION CURVE

A= 96.01772881 B= -0.28779766

DATA FOR CALIBRATION CURVE - TRAY 2

POINTS FOR ABSISSA
0.0 26.0 3.5 45.0 50.0

POINTS FOR ORDINATE
11.400 24.400 11.340 27.600 18.24

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	25.70	60.00	24.00

CONSTANTS FOR CALIBRATION CURVE
A = 0.444444 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 3

POINTS FOR ABSISSA
0.0 11.0 21.0 60.0 47.0

POINTS FOR ORDINATE
22.510 14.960 21.130 29.080 25.1200

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	23.14	60.00	18.15

CONSTANTS FOR CALIBRATION CURVE
A = 0.444444 B = -0.000000

DATA FOR CALIBRATION CURVE - TRAY 6

POINTS FOR ABSCISSA

90.0 82.0 72.0

POINTS FOR ORDINATE

81.0000 84.0000 88.0500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	112.33	60.00	92.72

CONSTANTS FOR CALIBRATION CURVE

A= 116.25005722 B= -0.39221382

DATA FOR CALIBRATION CURVE - TRAY 7

POINTS FOR ABSCISSA

94.0 71.0 54.0 58.0 48.0

POINTS FOR ORDINATE

87.2900 90.5400 92.7100 92.2800 93.6000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.79	60.00	91.97

CONSTANTS FOR CALIBRATION CURVE

A= 100.15437031 B= -0.13646725

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSISSA

85.0 15.0

POINTS FOR ORIGINATE

81.0000 84.0000 88.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	115.33	60.00	98.75

CONSTANTS FOR CALIBRATION CURVE
A = 115.33 B = -0.0000

DATA FOR CALIBRATION CURVE - TRAY

POINTS FOR ABSISSA

94.0 71.0 58.0 48.0

POINTS FOR ORIGINATE

81.0000 84.0000 88.0000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	98.75	60.00	91.93

CONSTANTS FOR CALIBRATION CURVE
A = 100.12437031 B = -0.1

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSCISSA

94.0 78.0 65.0 68.0 61.0

POINTS FOR ORDINATE

92.7800 94.8500 95.7300 95.5900 96.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.67	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A= 102.71998405 B= -0.10450800

DATA FOR CALIBRATION CURVE - PROD

POINTS FOR ABSCISSA

63.0 58.7 51.5 51.0 51.0

POINTS FOR ORDINATE

96.8900 97.6900 98.1500 97.9400 98.3300

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.08	60.00	97.33

CONSTANTS FOR CALIBRATION CURVE

A= 103.03257561 B= -0.09506860

DATA FOR CALIBRATION CURVE - TRAY 8

POINTS FOR ABSISSA

94.0 78.0 62.0 68.0 61.0

POINTS FOR ORDINATE

92.7800 94.8500 92.7300 92.5900 92.4000

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	101.61	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A = 102.7198405 B = -0.10450

DATA FOR CALIBRATION CURVE - PROI

POINTS FOR ABSISSA

63.0 58.7 51.5 51.0 51.0

POINTS FOR ORDINATE

92.8500 97.8500 92.1500 91.1500 91.1500

POINTS FOR CHECK ON EQUATION OF LINE

X	Y	X	Y
10.00	102.68	60.00	96.45

CONSTANTS FOR CALIBRATION CURVE

A = 103.0822501 B = -0.10450

TABLE D-50 CLOSED LOOP - COMP. CONTROLLER SET PNT. - RUN 2

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0	2.5	5.0	7.5	10.0	15.0	20.0	25.0	30.0	35.0
40.0	50.0	60.0							

TRANSIENT DATA - CHART PERCENT

BOTTOM

82.0	82.0	74.5	66.0	60.5	57.0	54.5	54.0	53.5	53.0
53.5	54.0	54.0							

TRAY 1

65.0	62.0	48.0	37.0	31.0	26.0	22.5	21.0	20.0	20.0
19.5	20.5	21.0							

TRAY 2

74.0	67.0	60.0	55.0	52.0	49.5	50.0	50.5	50.0	50.0
50.0	50.0	50.0							

TRAY 3

72.2	67.0	61.0	57.0	56.5	54.0	53.0	53.5	53.0	53.0
53.0	53.0	53.0							

TRAY 4

56.0	46.0	32.0	30.0	29.5	28.0	26.5	26.5	27.5	28.0
29.5	30.0	30.0							

TRAY 5

72.0	62.3	53.5	52.5	52.0	50.0	50.0	50.0	50.0	50.0
50.0	51.0	51.0							

TRAY 6

82.0	77.0	74.0	73.0	72.2	72.0	71.7	71.8	72.0	72.0
72.0	72.0	72.0							

TRAY 7

73.0	63.0	55.0	55.0	54.5	52.0	52.0	52.0	52.0	52.0
53.0	53.0	53.0							

TRAY 8

80.0	73.5	69.0	66.5	65.5	64.3	64.1	64.0	64.6	64.3
64.5	64.5	64.5							

PROD

57.5	56.5	55.0	53.0	52.2	51.8	51.8	51.8	51.8	51.8
51.8	51.8	51.8							

TABLE D-20 CLOSED LOOP - COMP. CONTROLLER SET PNT. - 80

DATA READ AT THE FOLLOWING TIMES - MINUTES

0.0 5.2 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

TRANSIENT DATA - CHART PERCENT

BOTTOM		TRAY 1		TRAY 2		TRAY 3		TRAY 4		TRAY 5		TRAY 6		TRAY 7		TRAY 8		PROD	
85.0	84.0	65.0	64.0	45.0	44.0	25.0	24.0	5.0	4.0	15.0	14.0	75.0	74.0	55.0	54.0	65.0	64.0	51.8	51.5
84.0	83.0	64.0	63.0	44.0	43.0	24.0	23.0	4.0	3.0	14.0	13.0	74.0	73.0	54.0	53.0	64.0	63.0	51.5	51.2
83.0	82.0	63.0	62.0	43.0	42.0	23.0	22.0	3.0	2.0	13.0	12.0	73.0	72.0	53.0	52.0	63.0	62.0	51.2	50.9
82.0	81.0	62.0	61.0	42.0	41.0	22.0	21.0	2.0	1.0	12.0	11.0	72.0	71.0	52.0	51.0	62.0	61.0	50.9	50.6
81.0	80.0	61.0	60.0	41.0	40.0	21.0	20.0	1.0	0.0	11.0	10.0	71.0	70.0	51.0	50.0	61.0	60.0	50.6	50.3
80.0	79.0	60.0	59.0	40.0	39.0	20.0	19.0	0.0	0.0	10.0	9.0	70.0	69.0	50.0	49.0	60.0	59.0	50.3	50.0
79.0	78.0	59.0	58.0	39.0	38.0	19.0	18.0	0.0	0.0	9.0	8.0	69.0	68.0	49.0	48.0	59.0	58.0	50.0	49.7
78.0	77.0	58.0	57.0	38.0	37.0	18.0	17.0	0.0	0.0	8.0	7.0	68.0	67.0	48.0	47.0	58.0	57.0	49.7	49.4
77.0	76.0	57.0	56.0	37.0	36.0	17.0	16.0	0.0	0.0	7.0	6.0	67.0	66.0	47.0	46.0	57.0	56.0	49.4	49.1
76.0	75.0	56.0	55.0	36.0	35.0	16.0	15.0	0.0	0.0	6.0	5.0	66.0	65.0	46.0	45.0	56.0	55.0	49.1	48.8
75.0	74.0	55.0	54.0	35.0	34.0	15.0	14.0	0.0	0.0	5.0	4.0	65.0	64.0	45.0	44.0	55.0	54.0	48.8	48.5
74.0	73.0	54.0	53.0	34.0	33.0	14.0	13.0	0.0	0.0	4.0	3.0	64.0	63.0	44.0	43.0	54.0	53.0	48.5	48.2
73.0	72.0	53.0	52.0	33.0	32.0	13.0	12.0	0.0	0.0	3.0	2.0	63.0	62.0	43.0	42.0	53.0	52.0	48.2	47.9
72.0	71.0	52.0	51.0	32.0	31.0	12.0	11.0	0.0	0.0	2.0	1.0	62.0	61.0	42.0	41.0	52.0	51.0	47.9	47.6
71.0	70.0	51.0	50.0	31.0	30.0	11.0	10.0	0.0	0.0	1.0	0.0	61.0	60.0	41.0	40.0	51.0	50.0	47.6	47.3
70.0	69.0	50.0	49.0	30.0	29.0	10.0	9.0	0.0	0.0	0.0	0.0	60.0	59.0	40.0	39.0	50.0	49.0	47.3	47.0
69.0	68.0	49.0	48.0	29.0	28.0	9.0	8.0	0.0	0.0	0.0	0.0	59.0	58.0	39.0	38.0	49.0	48.0	47.0	46.7
68.0	67.0	48.0	47.0	28.0	27.0	8.0	7.0	0.0	0.0	0.0	0.0	58.0	57.0	38.0	37.0	48.0	47.0	46.7	46.4
67.0	66.0	47.0	46.0	27.0	26.0	7.0	6.0	0.0	0.0	0.0	0.0	57.0	56.0	37.0	36.0	47.0	46.0	46.4	46.1
66.0	65.0	46.0	45.0	26.0	25.0	6.0	5.0	0.0	0.0	0.0	0.0	56.0	55.0	36.0	35.0	46.0	45.0	46.1	45.8
65.0	64.0	45.0	44.0	25.0	24.0	5.0	4.0	0.0	0.0	0.0	0.0	55.0	54.0	35.0	34.0	45.0	44.0	45.8	45.5
64.0	63.0	44.0	43.0	24.0	23.0	4.0	3.0	0.0	0.0	0.0	0.0	54.0	53.0	34.0	33.0	44.0	43.0	45.5	45.2
63.0	62.0	43.0	42.0	23.0	22.0	3.0	2.0	0.0	0.0	0.0	0.0	53.0	52.0	33.0	32.0	43.0	42.0	45.2	44.9
62.0	61.0	42.0	41.0	22.0	21.0	2.0	1.0	0.0	0.0	0.0	0.0	52.0	51.0	32.0	31.0	42.0	41.0	44.9	44.6
61.0	60.0	41.0	40.0	21.0	20.0	1.0	0.0	0.0	0.0	0.0	0.0	51.0	50.0	31.0	30.0	41.0	40.0	44.6	44.3
60.0	59.0	40.0	39.0	20.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	49.0	30.0	29.0	40.0	39.0	44.3	44.0
59.0	58.0	39.0	38.0	19.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	49.0	48.0	29.0	28.0	39.0	38.0	44.0	43.7
58.0	57.0	38.0	37.0	18.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	48.0	47.0	28.0	27.0	38.0	37.0	43.7	43.4
57.0	56.0	37.0	36.0	17.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	47.0	46.0	27.0	26.0	37.0	36.0	43.4	43.1
56.0	55.0	36.0	35.0	16.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	46.0	45.0	26.0	25.0	36.0	35.0	43.1	42.8
55.0	54.0	35.0	34.0	15.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	44.0	25.0	24.0	35.0	34.0	42.8	42.5
54.0	53.0	34.0	33.0	14.0	13.0	0.0	0.0	0.0	0.0	0.0	0.0	44.0	43.0	24.0	23.0	34.0	33.0	42.5	42.2
53.0	52.0	33.0	32.0	13.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	43.0	42.0	23.0	22.0	33.0	32.0	42.2	41.9
52.0	51.0	32.0	31.0	12.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	41.0	22.0	21.0	32.0	31.0	41.9	41.6
51.0	50.0	31.0	30.0	11.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	41.0	40.0	21.0	20.0	31.0	30.0	41.6	41.3
50.0	49.0	30.0	29.0	10.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	39.0	20.0	19.0	30.0	29.0	41.3	41.0
49.0	48.0	29.0	28.0	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	39.0	38.0	19.0	18.0	29.0	28.0	41.0	40.7
48.0	47.0	28.0	27.0	8.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	38.0	37.0	18.0	17.0	28.0	27.0	40.7	40.4
47.0	46.0	27.0	26.0	7.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	37.0	36.0	17.0	16.0	27.0	26.0	40.4	40.1
46.0	45.0	26.0	25.0	6.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	35.0	16.0	15.0	26.0	25.0	40.1	39.8
45.0	44.0	25.0	24.0	5.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	35.0	34.0	15.0	14.0	25.0	24.0	39.8	39.5
44.0	43.0	24.0	23.0	4.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	34.0	33.0	14.0	13.0	24.0	23.0	39.5	39.2
43.0	42.0	23.0	22.0	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	32.0	13.0	12.0	23.0	22.0	39.2	38.9
42.0	41.0	22.0	21.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0	31.0	12.0	11.0	22.0	21.0	38.9	38.6
41.0	40.0	21.0	20.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.0	30.0	11.0	10.0	21.0	20.0	38.6	38.3
40.0	39.0	20.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	29.0	10.0	9.0	20.0	19.0	38.3	38.0
39.0	38.0	19.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.0	28.0	9.0	8.0	19.0	18.0	38.0	37.7
38.0	37.0	18.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	27.0	8.0	7.0	18.0	17.0	37.7	37.4
37.0	36.0	17.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	26.0	7.0	6.0	17.0	16.0	37.4	37.1
36.0	35.0	16.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.0	25.0	6.0	5.0	16.0	15.0	37.1	36.8
35.0	34.0	15.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	24.0	5.0	4.0	15.0	14.0	36.8	36.5
34.0	33.0	14.0	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	23.0	4.0	3.0	14.0	13.0	36.5	36.2
33.0	32.0	13.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	22.0	3.0	2.0	13.0	12.0	36.2	35.9
32.0	31.0	12.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	21.0	2.0	1.0	12.0	11.0	35.9	35.6
31.0	30.0	11.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0	20.0	1.0	0.0	11.0	10.0	35.6	35.3
30.0	29.0	10.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	19.0	0.0	0.0	10.0	9.0	35.3	35.0
29.0	28.0	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									

TABLE D-51 CLOSED LOOP - COMP. CONTROLLER SET PNT. - RUN 2

TRANSIENT DATA - WEIGHT FRACTION

TIME	BOTTOMS	TRAY 1	TRAY 2	TRAY 3	TRAY 4	TRAY 5	TRAY 6	TRAY 7	TRAY 8	PRODUCT
0.00	0.0375	0.2203	0.3657	0.5022	0.6501	0.7530	0.8409	0.9019	0.9436	0.9757
2.50	0.0375	0.2288	0.3937	0.5192	0.6733	0.7809	0.8605	0.9156	0.9504	0.9766
5.00	0.0523	0.2686	0.4218	0.5388	0.7059	0.8062	0.8723	0.9265	0.9551	0.9780
7.50	0.0689	0.2999	0.4418	0.5518	0.7105	0.8091	0.8762	0.9265	0.9577	0.9799
10.00	0.0797	0.3169	0.4538	0.5534	0.7117	0.8105	0.8793	0.9272	0.9587	0.9807
15.00	0.0866	0.3311	0.4638	0.5616	0.7152	0.8163	0.8801	0.9306	0.9600	0.9811
20.00	0.0915	0.3411	0.4618	0.5648	0.7186	0.8163	0.8813	0.9306	0.9602	0.9811
25.00	0.0925	0.3453	0.4598	0.5632	0.7186	0.8163	0.8809	0.9306	0.9603	0.9811
30.00	0.0935	0.3482	0.4618	0.5648	0.7163	0.8163	0.8801	0.9306	0.9597	0.9811
35.00	0.0944	0.3482	0.4618	0.5648	0.7152	0.8163	0.8801	0.9306	0.9600	0.9811
40.00	0.0935	0.3496	0.4618	0.5648	0.7117	0.8163	0.8801	0.9292	0.9598	0.9811
50.00	0.0925	0.3468	0.4618	0.5648	0.7105	0.8134	0.8801	0.9292	0.9598	0.9811
60.00	0.0925	0.3453	0.4618	0.5648	0.7105	0.8134	0.8801	0.9292	0.9598	0.9811

A P P E N D I X V
STEADY-STATE PROGRAM AND EXPERIMENTAL
STEADY-STATE DATA

Presented in Appendix V is a sample of the Fortran program written to use the steady state experimental data in calculating the steady state Murphree Liquid Efficiencies, constants A and B, average heat transfer coefficient and initial conditions for the unsteady state program.

Following is a list of the tables which are included in this Appendix.

<u>Table</u>	<u>Title</u>
S-1	Open Loop - Feed Flow - Run 1
S-2	Open Loop - Feed Flow - Run 2
S-3	Open Loop - Reflux Flow - Run 1
S-4	Open Loop - Reflux Flow - Run 2
S-5	Open Loop - Steam Flow - Run 1
S-6	Open Loop - Steam Flow - Run 2
S-7	Open Loop - Feed Composition - Run 1
S-8	Open Loop - Feed Composition - Run 2
S-9	Closed Loop - Feed Flow - Run 1
S-10	Closed Loop - Feed Flow - Run 2
S-11	Closed Loop - Steam Flow - Run 1
S-12	Closed Loop - Steam Flow - Run 2
S-13	Closed Loop - Comp. Controller Set Point - Run 1
S-14	Closed Loop - Comp. Controller Set Point - Run 2

Description of Steady State Program

The purpose of this program is two-fold.

- 1) Given the following experimental data
 - a) solution compositions of the trays, bottoms, product, and feed
 - b) flow rates of the feed, steam and thermal conditions of the previous two steams

Murphree liquid efficiencies are evaluated as defined by the equation $EX_{ML} = (X_n - X_{n+1}) / (X_{E_n} - X_{n+1})$

- 2) The initial conditions for the unsteady state program are calculated.

Variables in the program are as follows:

XEF	points on the abscissa of the equilibrium curve, wt. fraction
YEF	points on the ordinate of the equilibrium curve, wt. fraction
XHL	points on the abscissa of the liquid enthalpy curve, weight fraction
HLF	points on the ordinate of the liquid enthalpy curve, BTU/lbm
TRX	points on the abscissa of the reboiler temperature curve, BTU/lbm
TRX	points on the abscissa of the reboiler temperature curve, °F
F	feed flow rate, lbm/hr.
S	steam flow rate, lbm/hr.
RD	reflux flow rate, lbm/hr.
TR	temperature of reboiler solution, °F
TS	temperature of reboiler steam chest, °F

LAMB	heat of condensation of steam, BTU/lbm
HSI	enthalpy of incoming steam, BTU/lbm
XF	feed composition, weight fraction
X	liquid compositions, weight fraction
HF	enthalpy of feed stream, BTU/lbm
HL	enthalpies of the liquid streams, BTU/lbm
Y	vapor compositions, weight fraction
HV	enthalpies of the vapor streams, BTU/lbm
XD	composition of the product stream, weight fraction
XB	composition of the bottoms stream, weight fraction
D	product flow rate, lbm/hr.
B	bottoms flow rate, lbm/hr.
RR	reflux ratio
LT	liquid flow rates, lbm/hr.
V	vapor flow rates, lbm/hr.
YT	dummy variable in iteration scheme
YE	equilibrium vapor compositions, weight fraction
XE	equilibrium liquid compositions, weight fraction
YEM	equilibrium vapor compositions, mole fraction
YM	vapor compositions, mole fraction
EV	vapor efficiency, $Y(K)/YE(K)$
EW	Murphree vapor efficiencies based on weight fraction
EX	Murphree liquid efficiencies based on weight fraction
E	Murphree vapor efficiencies based on mole fraction
HB	enthalpy of the bottoms stream, BTU/lbm

TEQR	theoretical heat to reboiler, BTU/hr.
QR	actual experimental heat to reboiler, BTU/hr.
QRL	heat loss from the reboiler, BTU/hr.
QLP	heat loss from a plate, BTU/hr.
XT	liquid composition, weight fraction
XTT	transfer variable for liquid compositions into subroutine that controls format of print out for the thesis
YTT	as above except for vapor composition
YET	as above except for vapor equilibrium compositions
TLT	as above except for liquid flow rates
VT	as above except for vapor flow rates
ET	as above except for efficiency
QLT	as above except for heat losses
DXT	derivative of solution composition with respect to time, weight fraction/hr.
UAT	overall heat transfer coefficient, $\text{BTU/hr.}^{\circ}\text{F ft}^2$
UATA	average overall heat transfer coefficient
TSS	corrected steam reboiler temperature, $^{\circ}\text{F}$
BHLO	constants used to calculate enthalpy of liquid
AHLO	condensate leaving the reboiler
TSA	steam temperature - check of previous calculation, $^{\circ}\text{F}$
TQR	heat load - check on previous calculation, BTU/hr.

IBFTC COLUMN

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COMMON XTT(6,10),YTT(6,10),YET(6,10),TLT(6,10),VT(6,10
1),ET(6,10),
1XF(6),F(6),XDP(6),XBP(6),D(6),B(6),QR(6),TEQR(6),QC(6)
1,QCCL(6),
2UATA,QRLP(6),QLPP(6),DQ(6),NTT,NDAT,CLT(6,10),NRS,ITIT
1(10)
REAL S(10),YEM(10),LAMB(10),YM(11),YEF(50),XEF(50),HLF
1(50),XHL(50)
1,RC(10),EV(10),TL(10),RT(10),YE(10),E(10),HV(10),HL(10
1),Y(12),
2X(10),V(10),TS(10),TR(10),UAT(10),UA(10),TSA(10),TQR(1
10),TSS(10),
3DXT(10),TRX(20),TRY(20),PCS(10)
DIMENSION EW(10),EX(10),XE(10)
READ (5,15) NT,LF,NF,NPX,NPH,NTR,NDAT,NRUN,NRS
WRITE(6,15) NT,LF,NF,NPX,NPH,NTR,NDAT,NRUN,NRS
15 FORMAT (1X,10I5)
2 FORMAT (1H ,F11.8,5F12.8)
4 FORMAT (1H ,7F10.5)
C** EQUILIBRIUM DATA
DO 95 J=1,NPX
95 READ(5,96)XEF(J),YEF(J)
C** LIQUID ENTHALPY DATA
DO 97 J=1,NPH
97 READ(5,96) XHL(J),HLF(J)
96 FORMAT (6X,2F15.8)
C**
C** TEMPERATURE OF THE REBOILER
READ(5,2) (TRX(N),N=1,NTR)
WRITE(6,2)(TRX(N),N=1,NTR)
READ(5,2) (TRY(N),N=1,NTR)
WRITE(6,4)(TRY(N),N=1,NTR)
C** CONSTANTS FOR REFLUX FLOW RATE
BRD=ALOG(200./71.)/ALOG(72./10.)
ARC=200./((72.**BRD)
WRITE(6,2) BRD,ARC
CCHV=1143.
SLOHV=613.8
VALUE=0.000005
C** INITIAL CONDITIONS
DO 5 NR=1,NRUN
CRL=C.0
CLP=C.0
ICUT=C
READ(5,12) (ITIT(J),J=1,10)
12 FORMAT (1X,10A6)
READ(5,15) LF
89 DO 5 I=1,NDAT
JN=0
READ(5,1) F(I),S(I),PCS(I),TR(I),TS(I),LAMB(I),HSI,XF(
1I),SPG
WRITE(6,1)F(I),S(I),PCS(I),TR(I),TS(I),LAMB(I),HSI,XF(
1I),SPG
1 FORMAT (1H ,7F8.2,F8.4,F7.4)

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1 FCNRMAT (1F, 7F12.5, 7F12.5, 4F7.4)
11, 2PC
WRITE(6,1) F(1), S(1), PC2(1), TR(1), TS(1), LAMB(1), H21, XFI
11, 2PC
READ(5,1) F(1), S(1), PC2(1), TR(1), TS(1), LAMB(1), H21, XFI
89 EC 5 I=1, NCAT
READ(5,12) LF
12 FCNRMAT (1X, 10A6)
READ(5,12) (TIT(1), J=1, 10)
ICUT=C
CLP=C.0
CRL=C.0
EC 5 NR=1, NR1
INITIAL CONDITIONS
VALUE=C.000005
SLCHV=613.4
CCHV=1143.
WRITE(6,2) BR1, AR1
ARC=200. \ (12.5*BRD)
BRD=ALOG(200. \ V1. \)/ALOG(12.5 \ V1. \)
CONSTANTS FOR REFLUX FLOW RATE
WRITE(6,4) (TRY(N), N=1, NTR)
READ(5,2) (TRY(N), N=1, NTR)
WRITE(6,2) (TRY(N), N=1, NTR)
READ(5,2) (TRY(N), N=1, NTR)
WRITE(6,2) (TRY(N), N=1, NTR)
READ(5,2) (TRY(N), N=1, NTR)
TEMPERATURE OF THE REBOILER
96 FCNRMAT (6X, 2F12.8)
97 READ(5,96) XHL(1), HLF(1)
EC 97 J=1, NPI
C**
LIQUID ENTHALPY DATA
95 READ(5,95) XHF(1), YLF(1)
EC 95 J=1, NPX
C**
EQUILIBRIUM DATA
4 FCNRMAT (1F, 7F12.5)
5 FCNRMAT (1F, 7F12.5, 2F12.8)
12 FCNRMAT (1X, 10I5)
WRITE(6,12) NT, LF, NT, NPX, NPH, NTR, NCAT, NRUN, NRS
READ(5,12) NT, LF, NT, NPX, NPH, NTR, NCAT, NRUN, NRS
C**
DIMENSION EW(10), EX(10), XE(10)
3EXT(10), TRX(20), TRY(20), PCS(10)
IC, TS2(10),
SX(10), V(10), TS(10), TR(10), UAT(10), UA(10), TSA(10), TOR(1
11, Y12)
1, RC(10), EV(10), TL(10), RT(10), Y(10), E(10), HV(10), HL(10
1(50), XHL(50)
REAL 2(10), YFH(10), LAMB(10), YM(11), YFF(50), XFF(50), HLI
1(10)
2LATA, GRP(6), OLP(6), NS(6), NIT, NDAI, CLT(6,10), NRS, ITII
1, GCL(6),
1XL(6), F(6), XHP(6), D(6), H(6), GR(6), TEW(6), GCL(6)
1), ET(6,10),
COMMON XIT(6,10), YIT(6,10), YET(6,10), TET(6,10), VIE(6,10
187FC COLUMN


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      NTT=NT+1
      READ (5,2) (X(K),K=1,NTT)
      WRITE (6,2) (X(K),K=1,NTT)
C**  ENTHALPY OF THE FEED
      DO 31 J=1,NPH
      IF (XHL(J)-XF(I)) 31,32,33
31  CONTINUE
32  HF=HLF(J)
      GO TO 40
33  SLOPE=(HLF(J)-FLF(J-1))/(XHL(J)-XHL(J-1))
      HF=(SLOPE*(XF(I)-XHL(J-1))+HLF(J-1))
C**  ENTHALPY OF THE REFLUX
40  DO 6 J=10,NPH
      IF (XHL(J)-X(1)) 6,7,8
6  CONTINUE
7  FL(1)=HLF(J)
      GO TO 9
8  SLOPE=(HLF(J)-FLF(J-1))/(XHL(J)-XHL(J-1))
      FL(1)=(SLOPE*(X(1)-XHL(J-1))+HLF(J-1))
9  Y(2)=X(1)
C**  ENTHALP OF THE VAPOR OFF THE TOP TRAY
      HV(2)=1143.-613.8*Y(2)
C**  CALCULATION OF C AND B
      XD=X(1)
      XB=X(NTT)
      XDP(I)=XD
      XBP(I)=XB
      C(I)=F(I)*(XF(I)-XB)/(XD-XB)
      B(I)=F(I)-C(I)
C**  CALCULATION OF THE REFLUX FLOW RATE
      RD(I)=SQRT(SPG)*ARD*(PCS(I)**BRD)
C**  REFLUX RATIO
      RR=RD(I)/C(I)
      WRITE (6,10) RR
10  FORMAT (1H ,F10.5)
C**  ADDITIONAL REFLUX DUE TO CONDENSATION ON THE WALLS
      RFDC=0.0
      TL(1)=RD(I)+RFDC
      V(2)=TL(1)+C(I)
C**
C**  CALCULATION OF VAPOR COMPOSITIONS GIVEN THE LIQUID COM
      POSITIONS
C**
18  DO 20 N=2,NT
      M=N+1
      K=N-1
      YT=Y(N)-0.005
30  Y(M)=YT
      FV(M)=COHV-SLOFV*Y(M)
      DO 25 J=1,NPH
      IF (XHL(J)-X(N)) 25,26,27
25  CCNTINUE
26  FL(N)=FLF(J)
      GO TO 28
27  SLOPE=(HLF(J)-FLF(J-1))/(XHL(J)-XHL(J-1))

```

```

27 SLOPE=(HLE(J)-HLE(J-1))/(XHL(J)-XHL(J-1))
GO TO 28
26 HLN=HLE(J)
25 CONTINUE
IF (XHL(J)-XHL(J-1)) 25,26,27
DO 25 J=1,NPH
FVN=CHV-STOV*Y(M)
Y(M)=YI
YI=Y(N)-O.COP
K=-1
N=N+1
18 DO 20 N=2,N1
POSITIONS
**
**
CALCULATION OF VAPOR COMPOSITIONS GIVE THE LIQUID
**
**
V(S)=TL(I)+E(I)
TL(I)=RC(I)+PFC
PFC=0.0
**
**
ADDITIONAL REFLEX DUE TO CONDENSATION ON THE WALLS
10 FORMAT (1F,1IC,2)
WRITE (6,10)
PR=RC(I)/E(I)
**
**
REFLEX RATIO
RC(I)=SQRT(SPG)*ARD*(PC2(I)**BRD)
**
**
CALCULATION OF THE REFLEX FLOW RATE
B(I)=E(I)-E(I)
E(I)=E(I)*(XFI(XB)-XD-XB)
XBP(I)=X
XBP(I)=XB
XBP(I)=XB
XB=X(N1)
XC=X(I)
**
**
CALCULATION OF C AND B
FV(S)=1143.-01*.8*Y(S)
ENTHALP OF THE VAPOR OF THE TOP TRAY
9 Y(S)=X(I)
*LI)=(SLOPE*(X(I)-XHL(J-1))+HLE(J-1))
SLOPE=(HLE(J)-HLE(J-1))/(XHL(J)-XHL(J-1))
GO TO 9
7 LI(I)=HLE(J)
6 CONTINUE
IF (XHL(J)-X(I)) 6,7,
4C DO 6 J=10,NPH
ENTHALPY OF THE REFLEX
**
**
H=(SLOPE*(X(I)-XHL(J-1))+HLE(J-1))
SLOPE=(HLE(J)-HLE(J-1))/(XHL(J)-XHL(J-1))
GO TO 40
32 H=HLE(J)
31 CONTINUE
IF (XHL(J)-X(I)) 31,32,33
DO 31 J=1,NPH
ENTHALPY OF THE FEED
**
**
WRITE (6,5) (X(K),K=1,N1)
READ (5,5) (X(K),K=1,N1)
N1=N1+1

```



```

      FL(N)=(SLCPE*(X(N)-XHL(J-1))+HLF(J-1))
28  IF (N-LF) 41,42,41
42  V(M)=TL(K)*HL(K)+V(N)*HL(N)-V(N)*HV(N)-TL(K)*HL(N)+F(I
      1)*FF-QLP
      V(M)=(V(M)-F(I)*HL(N))/(HL(N)-HV(M))
      TL(N)=V(M)+TL(K)-V(N)+F(I)
      Y(M)=(V(N)*Y(N)+TL(N)*X(N)-TL(K)*X(K)-F(I)*XF(I))/V(M)
      IF (ABS(YT-Y(M))-VALUE) 20,20,29
41  V(M)=TL(K)*HL(K)+V(N)*HL(N)-V(N)*HV(N)-TL(K)*HL(N)-QLP
      V(M)=V(M)/(HL(N)-HV(M))
      TL(N)=V(M)+TL(K)-V(N)
      Y(M)=(V(N)*Y(N)+TL(N)*X(N)-TL(K)*X(K))/V(M)
      IF (ABS(YT-Y(M))-VALUE) 20,20,29
29  YT=(YT+Y(M))/2.
      GO TO 30
20  CONTINUE
C**  EQUILUBRUIM VAPOR COMPOSITIONS
      M=NTT
      NB=NT+2
      DO 104 K=2,NTT
      DO 100 J=1,NPX
      IF (XEF(J)-X(K)) 100,101,102
100  CONTINUE
101  YE(K)=YEF(J)
      GO TO 104
102  SLOPE=(YEF(J)-YEF(J-1))/(XEF(J)-XEF(J-1))
      YE(K)=(X(K)-XEF(J-1))*SLOPE+YEF(J-1)
104  CONTINUE
C**  CONVERSION OF COMPOSITIONS TO MOLAR PERCENT
C**  CALCULATION OF XE
      RAT=32.04/18.016
      DO 35 K=2,NTT
      DO 36 J=1,NPX
      IF (YEF(J)-Y(K)) 36,37,38
36  CONTINUE
37  XE(K)=XEF(J)
      GO TO 35
38  SLOPE=(XEF(J)-XEF(J-1))/(YEF(J)-YEF(J-1))
      XE(K)=SLOPE*(Y(K)-YEF(J-1))+XEF(J-1)
35  CONTINUE
      DO 110 K=2,NTT
      YEM(K)=YE(K)/(RAT*(1.-YE(K))+YE(K))
110  YM(K)=Y(K)/(RAT*(1.-Y(K))+Y(K))
C**  MURFFRY EFFICIENCIES
      YM(NB)=0.0
      DO 111 K=2,NTT
      EV(K)=Y(K)/YE(K)
      EW(K)=(Y(K)-Y(K+1))/(YE(K)-Y(K+1))
      EX(K)=(X(K)-X(K-1))/(XE(K)-X(K-1))
111  E(K)=(YM(K)-YM(K+1))/(YEM(K)-YM(K+1))
C**  ENTHALPY OF THE BOTTOMS
65  DO 90 J=1,NPH
      IF (XHL(J)-XB) 90,91,92
90  CONTINUE
91  FB=HLF(J)

```



```

      GC TC 93
92 SLOPE=(HLF(J)-HLF(J-1))/(XHL(J)-XHL(J-1))
      HB=(SLOPE*(XB-XHL(J-1))+HLF(J-1))
      TL(NTT)=TL(NT)-V(NTT)
C** HEAT LOADS
93 FHF=F(I)*HF
      TEQR(I)=V(NTT)*HV(NTT)+TL(NTT)*HB-TL(NT)*HL(NT)+QRL
      QR(I)=S(I)*LAMB(I)
      QC(I)=D(I)*HL(1)+B(I)*HB+V(2)*(HV(2)-HL(1))+QRL+8.*QLP
      1-F(I)*HF
      QCOL(I)=V(2)*HV(2)+B(I)*HB-FHF-TL(1)*HL(1)+QRL+8.*QLP
      DQ(I)=QR(I)-TEQR(I)
      WRITE(6,170) QRL,QLP
170 FORMAT (1H$ ,22H HEAT LOSS -REBOILER=,F16.8,5X,7H PLAT
      1E=,F16.8)
      QRLP(I)=QRL
      QLPP(I)=QLP
      CLP=.8*DQ(I)/9.+QLP
      QRL=.2*DQ(I)+QRL
      IF (ABS(DQ(I)).GT..01)GO TO 18
C**
C** OUTPUT
C** OUTPUT OF THE EFFICIENCIES
      WRITE(6,39)
39 FORMAT (1H ,50H EM - Y EW - Y EW - X
      1 EV )
      DO 34 N=2,NTT
34 WRITE(6,2) E(N),EW(N),EX(N),EV(N)
      WRITE(6,80)
80CFORMAT (1H$ ,77H PLATE CONCL CCNCV CONCE
      1EFFICIENCY
      1 LIQUIDFLOW VAPORFLOW)
      E(1)=0.0
      V(1)=0.0
      Y(1)=0.0
      DO 81 K=1,M
81 WRITE (6,82) K,X(K),Y(K),YE(K),E(K),TL(K),V(K)
82 FORMAT (1H ,16,6F11.5)
      WRITE (6,84)
84CFORMAT (1H$ ,71H FEED OVERHEAD BOTTOMS
      1CCNCF
      1 CCNCD CONCB)
      WRITE (6,85)F(I),D(I),B(I),XF(I),XD,XB
85 FORMAT (1H ,6F12.7)
      WRITE(6,86)
86CFORMAT (1H$ ,69H HEAT ADDED HEAT REQUIRED
      1Q. COLUMN
      1 CC HEAT LOSS)
      WRITE(6,87) QR(I),TEQR(I),QCOL(I),QC(I),DQ
87 FORMAT (1H ,5F16.8)
C** REBOILER LIQUID TEMPERATURE
      DO 70 J=1,NTR
      IF (TRX(J)-XB) 70,71,72
70 CONTINUE
71 TR(I)=TRY(J)

```



```

GO TO 73
72 SLOPE=(TRY(J)-TRY(J-1))/(TRX(J)-TRX(J-1))
   TR(I)=SLOPE*(XB-TRX(J-1))+TRY(J-1)
C** REBOILER OVERALL HEAT TRANSFER COEFFICIENT
73 UAT(I)=TEQR(I)/(TS(I)-TR(I))
   UA(I)=QR(I)/(TS(I)-TR(I))
   WRITE(6,153)
153 FORMAT (1HS,50H EXP. UA.          TE.UA.
1      )
   WRITE(6,87) UA(I),UAT(I)
   WRITE(7,2) X(10),X(9),X(8),X(7),X(6),X(5)
   WRITE(7,2) X(4),X(3),X(2),X(1)
   QLT(I,1)=QRL
   DO 74 N=1,NTT
   M=NTT-N+1
   XTT(I,N)=X(M)
   YTT(I,N)=Y(M)
   YET(I,N)=YE(M)
   TLT(I,N)=TL(M)
   VT(I,N)=V(M)
74 ET(I,N)=EX(M)
   DO 75 N=2,NT
75 CLT(I,N)=QLP
   QRL=0.0
   CLP=0.0
C**
C** CHECK ON THE PREVIOUS METHOD
   DO 44 N=1,NTT
   M=N+1
   J=N-1
   IF (N.EQ.1) GO TO 46
   IF (N.EQ.NPI) GO TO 47
   IF (N.EQ.LF) GO TO 45
   DXT(N)=Y(M)*V(M)+X(J)*TL(J)-V(N)*Y(N)-TL(N)*X(N)
   GO TO 44
45 DXT(N)=Y(M)*V(M)+X(J)*TL(J)-V(N)*Y(N)-TL(N)*X(N)+F(I)*
1XF(I)
   GO TO 44
46 DXT(N)=Y(M)*V(M)-X(N)*TL(N)-D(I)*X(N)
   GO TO 44
47 DXT(N)=X(J)*TL(J)-X(N)*TL(N)-Y(N)*V(N)
44 CONTINUE
   WRITE(6,48)
48 FORMAT (1HS,50H      DERIVATIVES      OF THE D.E.
1      )
   WRITE(6,87) (DXT(N),N=1,NTT)
   WRITE(6,155) (HL(K),K=1,NTT)
   WRITE(6,155) (HV(K),K=1,NTT)
   WRITE(6,155) HF
   IOUT=IOUT+1
   IF (IOUT.LT.2) GO TO 5
C** AVERAGE OVERALL HEAT TRANSFER COEFFICIENT
   UATA=(UAT(1)+UAT(2))/2.
C** ADJUST THE STEAM TEMPERATURE
   DO 163 K=1,NDAT

```

```

CC 163 K=1,NDAT
**
ADJUST THE STEAM TEMPERATURE
DATA=(UAT(1)+UAT(2))/2.
**
AVERAGE OVERALL HEAT TRANSFER COEFFICIENT
IF (ICUT.LT.2) GO TO 2
ICUT=ICUT+1
WRITE(6,152) HF
WRITE(6,152) (HV(K),K=1,NTT)
WRITE(6,152) (FL(K),K=1,NTT)
WRITE(6,152) (DXT(N),N=1,NTT)
)
48 FORMAT (1F2,POF DERIVATIVES OF THE
WRITE(6,48)
44 CONTINUE
47 EXT(N)=X(J)*TL(N)-Y(N)*V(N)
CC TC 44
46 EXT(N)=Y(M)*V(M)+X(J)*TL(J)-V(N)*Y(N)-TL(N)*X(N)
CC TC 44
)
45 EXT(N)=Y(M)*V(M)+X(J)*TL(J)-V(N)*Y(N)-TL(N)*X(N)+F(I)*
CC TC 44
EXT(N)=Y(M)*V(M)+X(J)*TL(J)-V(N)*Y(N)-TL(N)*X(N)
IF (N.EC.LF) GO TO 42
IF (N.EC.NPI) GO TO 47
IF (N.EC.I) GO TO 46
J=N-1
M=N+1
CC 44 N=1,NTT
CHECK ON THE PREVIOUS METHOD
**
CLP=C.0
CRL=C.0
42 CLT(1,N)=CLP
CC 42 N=2,NTT
44 ET(1,N)=EX(M)
VT(1,N)=V(M)
TLT(1,N)=TL(M)
YET(1,N)=YE(M)
YTT(1,N)=Y(M)
XTT(1,N)=X(M)
M=NTT-N+1
CC 44 N=1,NTT
CLT(1,1)=CRL
WRITE(7,2) X(4),X(3),X(2),X(1)
WRITE(7,2) X(10),X(9),X(8),X(7),X(6),X(5)
WRITE(6,87) UAT(1),UAT(1)
)
153 FORMAT (1F2,POF EXP. UA.
TE.UA.
)
43 UAT(1)=TEGR(1)/TS(1)-TR(1)
UAT(1)=GR(1)/TS(1)-TR(1)
42 UAT(1)=TEGR(1)/TS(1)-TR(1)
REBOILER OVERALL HEAT TRANSFER COEFFICIENT
TR(1)=SLCP*(XP-TRX(J-1))+TRY(J-1)
SLCP=(TRY(J)-TRY(J-1))/(TRX(J)-TRX(J-1))
CC TC 73

```



```

163 TSS(K)=TEQR(K)/UATA+TR(K)
C**  CALCULATION OF A AND B FOR REBOILER
    R1=HSI+(UATA*(TR(1)-TSS(1)))/S(1)
    R2=HSI+(UATA*(TR(2)-TSS(2)))/S(2)
    BHLO=(R1-R2)/(TSS(1)-TSS(2))
    AHLC=R1-BHLO*TSS(1)
C**  CHECK ON CALCULATION OF A AND B
    DO 151 K=1,NDAT
    TSA(K)=(S(K)*HSI+UATA*TR(K)-AHLO*S(K))/(UATA+BHLO*S(K)
1)
151 TQR(K)=UATA*(TSA(K)-TR(K))
    WRITE(6,157)
157 FORMAT (1HS,50H  CALCULATED A AND B
1)
    WRITE(6,87) AHLC,BHLO
155 FORMAT (1X,10F13.6)
    WRITE(6,154)
154 FORMAT (1HS,115H  UAT1          UAT2          UATA
1TSS1
1 TSS1          TSA1          TS2          TSS2          TSA2
1)
    WRITE(6,155) UAT(1),UAT(2),UATA,TS(1),TSS(1),TSA(1),TS
1(2),TSS(2),T
1SA(2)
    WRITE(6,156)
156 FORMAT (1HS,50H  TEQR1          TQR1          TEQR2
1 TQR2 )
    WRITE(6,87) TEQR(1),TQR(1),TEQR(2),TQR(2)
    WRITE(6,158)
158 FORMAT (1HS,50H  TEMP. REBOILER 1  TEMP. REBOILER 2
1)
    WRITE(6,87) TR(1),TR(2)
    WRITE(6,78) UATA,AHLO,BHLO,HSI
    WRITE(7,78) UATA,AHLO,BHLO,HSI
    WRITE(6,79) F(1),F(2),S(1),S(2),RD(1),RD(2),XF(1),XF(2
1)
    WRITE(7,79)F(1),F(2),S(1),S(2),PCS(1),PCS(2),XF(1),XF(
12),SPG
79 FORMAT (1X,6F9.4,3F7.4)
78 FORMAT (6X,4F15.8,F10.4)
    ICUT=0
    K=1
    DO 76 N=1,NT
    M=K+1
    WRITE(6,77) XTT(K,N),ET(K,N),QLT(K,N),XTT(M,N),ET(M,N)
1,QLT(M,N)
76 WRITE(7,77) XTT(K,N),ET(K,N),QLT(K,N),XTT(M,N),ET(M,N)
1,QLT(M,N)
    K=1
    DO 88 N=1,NT
    M=K+1
    WRITE(6,77) YTT(K,N),ET(K,N),QLT(K,N),YTT(M,N),ET(M,N)
1,QLT(M,N)
88 WRITE(7,77) YTT(K,N),ET(K,N),QLT(K,N),YTT(M,N),ET(M,N)
1,QLT(M,N)

```



```
77 FORMAT (1X,2(F11.8,F12.8,F16.8))  
  WRITE(6,557)  
  WRITE(4,557)  
557 FORMAT (1F1)  
  CALL TPRINT  
5 CONTINUE  
  END
```



```

IBFTC  APRINT
SUBROUTINE TPRINT
COMMON XTT(6,10),YTT(6,10),YET(6,10),TLT(6,10),VT(6,10
1),ET(6,10),
1XF(6),F(6),XDP(6),XBP(6),D(6),B(6),QR(6),TEQR(6),QC(6)
1,QCCL(6),
2UATA,QRLP(6),QLPP(6),DQ(6),NTT,NDAT,QLT(6,10),NRS,ITIT
1(10)
DIMENSION TIT(4)
DATA TIT/6HINITIA,6H          ,6H FINAL,6H          /
1 FORMAT (1H1)
2 FORMAT (1H )
7 FORMAT (1H )
WRITE(6,15) (ITIT(J),J=1,10)
WRITE(4,15) (ITIT(J),J=1,10)
15 FORMAT (1FL,12X,10A6)
K=1
DO 4 I=1,NDAT
WRITE(6,16) TIT(K),TIT(K+1)
WRITE(4,16) TIT(K),TIT(K+1)
K=3
16 FORMAT (1FJ,34X,2A6)
WRITE(6,2)
WRITE(4,2)
WRITE(6,3)
WRITE(4,3)
3 FORMAT (1FS,12X,52HPLATE  CONCL  CONC  CONCE  EFFI
1CI  LIQUID
1VAPOR)
DO 5 N=1,NTT
WRITE(4,6) N,XTT(I,N),YTT(I,N),YET(I,N),ET(I,N),TLT(I,
1N),VT(I,N)
5 WRITE(6,6) N,XTT(I,N),YTT(I,N),YET(I,N),ET(I,N),TLT(I,
1N),VT(I,N)
6 FORMAT (1F ,12X,15,4(1X,F7.4),2(1X,F7.2))
WRITE(6,8)
WRITE(4,8)
8 FORMAT (1FJ,12X,46H          FLOWS RATES
1          )
WRITE(6,12)
WRITE(4,12)
12 FORMAT (1F ,12X,51H  FEED  PRODUCT  BOTTOMS  CONCF
1  CONC  C
1CNCB)
WRITE(6,9) F(I),D(I),B(I),XF(I),XDP(I),XBP(I)
WRITE(4,9) F(I),D(I),B(I),XF(I),XDP(I),XBP(I)
9 FORMAT (1FJ,12X,3(F7.2,2X),F7.4,2X,F7.4,2X,F7.4)
WRITE(6,10)
WRITE(4,10)
10 FORMAT (1FJ,12X,51H HEAT LOAD          HEAT LOSSES  REBO
1ILER  TRA
1Y )
WRITE(4,7)
WRITE(4,11) QR(I),QLT(I,1),QLT(I,2)
4 WRITE(6,11) QR(I),QLT(I,1),QLT(I,2)

```



```
11 FORMAT (1HS,12X,F10.2,18X,F10.2,2X,F10.2)
   WRITE(6,13)
   WRITE(4,13)
13 FORMAT (1HJ,12X,46HAVERAGE OVERALL HEAT TRNSFER COEFFI
   CIENT — — )
   WRITE(6,14) UATA
   WRITE(4,14) UATA
14 FORMAT (1HJ,20X,F16.4)
   WRITE(6,1)
   WRITE(4,1)
   RETURN
   END
```


Symbols Used in Tables S-1 Through S-14

CONCL	concentration of the methanol tray (plate) solution, weight fraction
CONCV	concentration of methanol vapor leaving the tray, weight fraction
CONCE	equilibrium concentration of liquid solution, weight fraction
EFFICI	Murphree Liquid Efficiencies
LIQUID	liquid flow rate, lbm/hr.
VAPOR	vapor flow rate, lbm/hr.
FEED	feed flow rate, lbm/hr.
PRODUCT	product flow rate, lbm/hr.
BOTTOMS	bottoms flow rate, lbm/hr.
CONCF	concentration of methanol in feed stream, weight fraction
CONCP	concentration of methanol in product stream, weight fraction
CONCB	concentration of methanol in bottoms stream, weight fraction
HEAT LOAD	reboiler heat load, BTU/hr.
HEAT LOSSES	from reboiler and each tray, BTU/hr.
	Average overall heat transfer coefficient units are BTU/hr. ^{°F}

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

11192.24 1517.84 674.60

HEAT LOSS HEAT LOSS REBOILER TRAY

150.50 76.00 74.50 0.5000 0.9778 0.0548

FEED PRODUCT BOTTOMS CONCENTRATION CONCENTRATION

FLUX RATES

PLATE	CONCENTRATION	CONCENTRATION	EFFICIENCY	LIQUID	VAPOR
10	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000

FINAL

11176.45

1758.63 76.50

HEAT LOSS

HEAT LOSS REBOILER TRAY

135.50 69.47 61.83 0.0000 0.9864 0.0000

FEED PRODUCT BOTTOMS CONCENTRATION CONCENTRATION

FLUX RATES

PLATE	CONCENTRATION	CONCENTRATION	EFFICIENCY	LIQUID	VAPOR
10	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000

INITIAL

TABLE S-2 OPEN LOOP - FEED FLCW - RUN 2

PLATE	INITIAL					
	CONCL	CCNCV	CONCE	EFFICI	LIQUID	VAPOR
1	C.0491	C.2932	0.2701	1.0407	60.30	101.78
2	C.2024	C.5561	0.6140	0.8181	162.08	115.83
3	C.3825	C.7260	0.7550	0.7119	176.13	129.55
4	0.5110	C.8056	0.8133	0.7754	189.85	137.73
5	C.5753	C.8436	0.8388	1.0855	198.03	142.84
6	C.7471	C.8866	0.9007	0.6729	81.13	148.75
7	C.8271	C.9242	0.9309	0.7950	87.05	154.34
8	0.8933	C.9500	0.9569	0.7142	92.64	158.15
9	C.9369	C.9705	0.9742	0.7827	96.45	161.11
10	C.9705	C.0000	0.0000	C.0000	99.41	0.00

FLOWS RATES					
FEED	PRODUCT	BOTTOMS	CONCF	CONCP	CONCB
122.00	61.70	60.30	0.5151	0.9705	0.0491
HEAT LOAD		HEAT LOSSES		REBOILER	TRAY
86591.39				1219.92	542.19

FINAL						
PLATE	CCNCL	CCNCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0061	0.0188	0.0407	0.7182	46.82	88.62
2	0.0144	0.0931	0.0963	0.9903	135.44	91.03
3	0.0635	0.2262	0.3259	0.7783	137.85	96.11
4	0.1541	0.5095	0.5415	0.9196	142.93	109.67
5	0.3589	0.7037	0.7428	0.7123	156.49	123.84
6	0.5082	0.7905	0.8121	0.7671	69.16	132.58
7	0.6779	0.8653	0.8759	0.8179	77.90	142.06
8	0.8117	0.9137	0.9248	0.7304	87.38	148.75
9	0.8921	0.9509	0.9564	0.8086	94.06	154.09
10	0.9509	0.0000	0.0000	0.0000	99.41	0.00

FLOWS RATES					
FEED	PRODUCT	BOTTOMS	CONCF	CONCP	CONCB
101.50	54.68	46.82	0.5151	0.9509	0.0061
HEAT LOAD		HEAT LOSSES		REBOILER	TRAY
86216.96				1628.40	723.73

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

7467.9492

86216.26 1628.46 753.73

HEAT LOSS		HEAT LOSSES		TRAY	
FEED	PRODUCT	BOTTOMS	CONCH	CONCH	TRAY
101.50	24.68	44.15	0.2151	0.250	1.000

FLWS RATES

PLATE	CONCL	CONCV	CONCH	EFFICI	LICUD	VAPOR
1	0.0181	0.0188	0.0407	0.7185	0.0181	0.0181
2	0.0144	0.0231	0.0781	0.7903	0.0144	0.0144
3	0.0132	0.0232	0.0783	0.7183	0.0132	0.0132
4	0.0141	0.0188	0.0242	0.7186	0.0141	0.0141
5	0.0188	0.0203	0.0258	0.7157	0.0188	0.0188
6	0.0208	0.0205	0.0151	0.7671	0.0208	0.0208
7	0.0172	0.0222	0.0172	0.8172	0.0172	0.0172
8	0.0117	0.0137	0.0137	0.7304	0.0117	0.0117
9	0.0221	0.0224	0.0224	0.7304	0.0221	0.0221
10	0.0209	0.0180	0.0000	0.7304	0.0209	0.0209

FINAL

86221.32 1519.25 242.12

HEAT LOSS		HEAT LOSSES		TRAY	
FEED	PRODUCT	BOTTOMS	CONCH	CONCH	TRAY
122.00	61.70	60.30	0.2151	0.250	1.000

FLWS RATES

PLATE	CONCL	CONCV	CONCH	EFFICI	LICUD	VAPOR
1	0.0181	0.0188	0.0407	0.7185	0.0181	0.0181
2	0.0144	0.0231	0.0781	0.7903	0.0144	0.0144
3	0.0132	0.0232	0.0783	0.7183	0.0132	0.0132
4	0.0141	0.0188	0.0242	0.7186	0.0141	0.0141
5	0.0188	0.0203	0.0258	0.7157	0.0188	0.0188
6	0.0208	0.0205	0.0151	0.7671	0.0208	0.0208
7	0.0172	0.0222	0.0172	0.8172	0.0172	0.0172
8	0.0117	0.0137	0.0137	0.7304	0.0117	0.0117
9	0.0221	0.0224	0.0224	0.7304	0.0221	0.0221
10	0.0209	0.0180	0.0000	0.7304	0.0209	0.0209

INITIAL

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

10976.25 1123.92 21.92

HEAT LOAD HEAT LOSSES REBOILER TRAY

150.30 76.22 73.75 0.2133 0.3803 0.58

FEEL PRODUCT BOTTOMS FLOW RATES CONCH

PLATE	CONCL	CONCV	CONCE	EFFICI	LICUID	VAPOR
10	0.0000	0.0000	0.0000	0.0000	134.00	0.00
9	0.0000	0.0000	0.0000	0.0000	131.00	0.00
8	0.0000	0.0000	0.0000	0.0000	128.00	0.00
7	0.0000	0.0000	0.0000	0.0000	125.00	0.00
6	0.0000	0.0000	0.0000	0.0000	122.00	0.00
5	0.0000	0.0000	0.0000	0.0000	119.00	0.00
4	0.0000	0.0000	0.0000	0.0000	116.00	0.00
3	0.0000	0.0000	0.0000	0.0000	113.00	0.00
2	0.0000	0.0000	0.0000	0.0000	110.00	0.00
1	0.0000	0.0000	0.0000	0.0000	107.00	0.00

FINAL

109381.03 1220.48 2584.48

HEAT LOAD HEAT LOSSES REBOILER TRAY

150.30 76.22 73.75 0.2133 0.3803 0.58

FEEL PRODUCT BOTTOMS FLOW RATES CONCH

PLATE	CONCL	CONCV	CONCE	EFFICI	LICUID	VAPOR
10	0.0000	0.0000	0.0000	0.0000	134.00	0.00
9	0.0000	0.0000	0.0000	0.0000	131.00	0.00
8	0.0000	0.0000	0.0000	0.0000	128.00	0.00
7	0.0000	0.0000	0.0000	0.0000	125.00	0.00
6	0.0000	0.0000	0.0000	0.0000	122.00	0.00
5	0.0000	0.0000	0.0000	0.0000	119.00	0.00
4	0.0000	0.0000	0.0000	0.0000	116.00	0.00
3	0.0000	0.0000	0.0000	0.0000	113.00	0.00
2	0.0000	0.0000	0.0000	0.0000	110.00	0.00
1	0.0000	0.0000	0.0000	0.0000	107.00	0.00

INITIAL

TABLE 2-7 FLOW LOSS - REBOILER

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

1744.32W

104124.64 1178.33 253.7

HEAT LOAD HEAT LOSSES REBOILER TRAY

120.30 79.82 70.48 0.2133 0.1642 0.0023

FEED PRODUCT BOTTOMS CONCH CONCH FLOWS RATES

PLATE	CONCL	CONCV	CONCH	EFFICI	LIQUID	VAPOR
10	0.2642	0.0000	0.0000	0.0000	117.41	104.03
9	0.2009	0.2642	0.0000	1.0000	116.20	104.03
8	0.8649	0.2642	0.0000	0.4229	112.78	104.7
7	0.7777	0.0000	0.9121	0.8398	104.11	111.77
6	0.6392	0.0000	0.8621	0.0000	92.74	104.7
5	0.4683	0.7898	0.0000	0.9292	82.27	112.22
4	0.3138	0.7122	0.0000	0.0000	100.89	102.00
3	0.1669	0.0000	0.2608	0.1296	106.23	13.44
2	0.0680	0.0000	0.0000	0.8101	108.21	1.00
1	0.0000	0.1071	0.1071	1.2609	11.44	118.03

FINAL

104148.38 884.64 392.41

HEAT LOAD HEAT LOSSES REBOILER TRAY

120.30 76.22 73.71 0.2133 0.1642 0.0023

FEED PRODUCT BOTTOMS CONCH CONCH FLOWS RATES

PLATE	CONCL	CONCV	CONCH	EFFICI	LIQUID	VAPOR
10	0.2803	0.0000	0.0000	0.0000	132.22	100.00
9	0.2280	0.0000	0.0000	0.7909	11.73	211.83
8	0.2223	0.0000	0.2712	0.6921	100.00	100.00
7	0.8821	0.0000	0.0000	0.7663	122.79	100.11
6	0.1923	0.9217	0.0000	1.1210	111.00	100.00
5	0.6102	0.8696	0.8732	0.9230	100.00	100.00
4	0.2146	0.8048	0.8144	0.0000	232.00	10.11
3	0.3732	0.7308	0.7202	0.7279	220.22	100.87
2	0.1681	0.2468	0.2622	0.0000	200.21	14.00
1	0.0280	0.2467	0.1723	1.1256	7.71	150.26

INITIAL

TABLE 1 - OPEN LOOP - REFLUX FLOW - 91

TABLE 8-2 OPEN FURN - STEAM T - RUN 1

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0028	0.0000	0.01824	1.0376	13.86	13.86
2	0.01432	0.0014	0.0171	0.9471	20.11	14.718
3	0.03427	0.0029	0.0164	0.8573	21.14	10.454
4	0.04934	0.0028	0.08061	0.8402	23.23	11.109
5	0.05282	0.0028	0.0806	0.8402	101.00	10.101
6	0.07833	0.0101	0.0914	0.8840	11.11	11.11
7	0.05511	0.0443	0.0916	0.9116	11.11	11.11
8	0.05332	0.0441	0.0908	0.9286	12.17	11.11
9	0.0549	0.0441	0.0811	0.9286	11.11	11.11
10	0.0549	0.0000	0.0000	0.0000	11.11	11.11

INITIAL

FEED	PRODUCT	BOTTOMS	CONCE	CONCH	CONCH
142.40	12.14	13.66	0.0117	0.4864	1.11
HEAT LCAL	HEAT LOSSES	REBOILER	TRAY		
11171.27	1409.44				

FLWS RATES

FINAL

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0103	0.0000	0.04414	1.1612	80.28	13.14
2	0.0162	0.0000	0.0441	0.9471	18.14	11.11
3	0.0322	0.0025	0.0812	0.8573	21.14	11.11
4	0.05861	0.0025	0.0806	0.8402	23.14	11.11
5	0.0533	0.0030	0.0806	0.8402	101.00	10.101
6	0.0549	0.0441	0.0916	0.9116	11.11	11.11
7	0.0507	0.0441	0.0916	1.1801	11.11	11.11
8	0.0541	0.0429	0.0908	0.9286	13.14	11.11
9	0.0511	0.0441	0.0908	0.9286	13.14	11.11
10	0.0549	0.0000	0.0000	0.0000	13.14	11.11

FLWS RATES

FEED	PRODUCT	BOTTOMS	CONCE	CONCH	CONCH
142.40	62.12	80.28	0.0117	0.4823	0.1111
HEAT LCAL	HEAT LOSSES	REBOILER	TRAY		
10422.88	132.27				

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

11171.27

TABLE S-6 OPEN LOOP - STEAM FLOW - RUN 2

PLATE	INITIAL					
	CONCL	CCNCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.1141	0.5253	0.4632	1.1354	81.26	138.70
2	0.3734	0.7308	0.7504	0.8050	219.96	159.32
3	0.5225	0.8179	0.8182	0.9907	240.58	171.31
4	0.5915	0.8478	0.8446	1.0553	252.57	177.16
5	0.7616	0.8933	0.9061	0.6930	109.02	185.68
6	0.8397	0.9361	0.9358	1.0107	117.54	194.57
7	0.9093	0.9622	0.9633	0.9396	126.43	200.19
8	0.9500	0.9774	0.9795	0.8127	132.05	203.30
9	0.9731	0.9858	0.9888	0.6328	135.16	204.76
10	0.9858	0.0000	0.0000	0.0000	136.62	0.00

FLOWS RATES					
FEED	PRODUCT	BOTTOMS	CONCF	CONCP	CONCB
149.40	68.14	81.26	0.5117	0.9858	0.1141
HEAT LOAD		HEAT LOSSES		REBOILER	TRAY
104287.84			806.12		358.28

FINAL						
PLATE	CCNCL	CCNCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0406	0.3388	0.2373	1.1597	74.61	132.87
2	0.2315	0.5783	0.6473	0.7562	207.48	150.21
3	0.3999	0.7365	0.7637	0.6973	224.81	167.43
4	0.5220	0.8190	0.8180	1.0123	242.04	179.98
5	0.7033	0.8730	0.8849	0.7474	105.19	189.68
6	0.8023	0.9212	0.9212	1.0002	114.89	199.46
7	0.8849	0.9490	0.9536	0.7953	124.67	205.16
8	0.9302	0.9684	0.9716	0.7914	130.36	209.02
9	0.9610	0.9817	0.9839	0.7861	134.23	211.41
10	0.9817	0.0000	0.0000	0.0000	136.62	0.00

FLCWS RATES					
FEED	PRODUCT	BOTTOMS	CONCF	CONCP	CONCB
149.40	74.79	74.61	0.5117	0.9817	0.0406
HEAT LOAD		HEAT LOSSES		REBOILER	TRAY
110305.78				1239.53	550.90

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

5222.9061

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

110362.78 153.53

HEAT LOSS REBOILER TRAY

149.40 74.72 74.21 0.2117 0.9814

FLWS RATES

FEED PRODUCT BOTTOMS CONC CONC

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOUR
1	0.1141	0.3338	1.1177	1.1297	74.01	135.87
2	0.2312	0.2783	0.6473	1.1177	207.48	150.21
3	0.3999	0.7369	0.7687	1.097	107.07	107.07
4	0.3338	0.8190	0.8180	1.0123	242.04	17.1
5	0.7033	0.8730	1.0147	1.7474	107.1	107.1
6	0.8817	1.0117	1.9217	1.0117	114.07	107.1
7	1.0117	0.9420	0.9997	0.7923	107.07	107.1
8	1.0117	0.9664	0.7713	1.7914	130.36	107.1
9	1.0117	1.0117	1.0117	0.7901	134.27	11.01
10	0.2817	1.0117	1.0117	1.000	136.65	.

104267.84

00.15

HEAT LCAL HEAT LOSSES REBOILER TRAY

149.40 74.72 74.21 0.2117 0.9814

FEED PRODUCT BOTTOMS CONC CONC

FLWS RATES

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOUR
1	0.1141	0.3338	1.1177	1.1354	71.26	138.7
2	0.2312	0.2783	0.6473	1.097	212.1	150.13
3	0.3999	0.8179	0.8182	0.9907	111.41	111.41
4	0.2312	0.8478	1.0117	1.0117	177.16	177.16
5	0.7616	0.8730	1.0117	1.6917	107.07	107.07
6	0.8817	1.0117	1.0117	1.0117	114.07	114.07
7	1.0117	0.9623	0.9997	0.9996	126.43	200.19
8	1.0117	0.9774	0.7713	1.8117	134.27	207.30
9	0.7717	1.0117	1.0117	1.0117	132.16	204.73
10	0.2828	1.000	0.000	1.000	147.07	.

INITIAL

TABLE 8-6 CPTN LCOP - STEAM FLOW - R

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

113941.94 1505.40 330.4

HEAT LOAD HEAT LOSSES REBOILER TRAY

150.11 88.21 81.54 0.0000

FEED PRODUCT BOTTOMS CONCP CONCP

FLWS RATES

PLATE	CONCL	CONCV	CONCI	EFFICI	LIQUID	VAPOR
1	0.1384	0.3124	0.2378	1.1332	87.59	132.1
2	0.2384	0.6184	0.6384	0.9284	503.09	10.11
3	0.4468	1.7429	0.7884	0.7884	521.47	132.00
4	0.5230	1.9280	0.8280	0.8280	588.97	188.37
5	0.7084	1.9423	0.8423	1.3027	102.38	191.73
6	0.8127	2.4282	0.8282	1.3011	110.77	207.00
7	0.8873	1.9448	0.9222	1.0238	144.11	212.00
8	0.7240	1.9847	0.9841	0.7284	129.33	210.00
9	0.9237	1.9814	0.9810	1.1321	144.18	219.73
10	0.9824	1.0000	1.0000	1.0000	110.77	0.00

FINAL

113944.83 1923.81 803.30

HEAT LOAD

HEAT LOSSES

REBOILER

TRAY

150.30 11.07 79.53 0.4284 0.9678 0.001

FEED PRODUCT BOTTOMS CONCP CONCI CONCP

FLWS RATES

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.1384	0.0717	0.0127	1.1332	87.59	110.86
2	0.2384	0.1429	0.0207	0.6707	129.09	123.00
3	0.4468	0.4443	0.3981	1.0376	503.20	141.1
4	0.5230	0.7884	0.6947	0.8146	520.77	161.44
5	0.7084	0.7640	0.7782	0.8242	82.37	171.83
6	0.8207	0.9447	0.8223	0.8329	100.76	184.81
7	0.8873	1.9024	0.9882	0.8220	113.73	191.9
8	0.8873	0.9328	0.9328	0.7284	124.41	207.00
9	0.9673	0.9673	0.9622	1.8841	131.24	207.00
10	0.9673	1.0000	1.0000	1.0000	136.72	0.00

INITIAL

TABLE 1 - FEED COMPOSITION - RUN 1

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

115461.20

HEAT LOSS REBOILER TRAY

150.50 73.39 76.11 0.4794 0.7222

FEED PRODUCT BOTTOMS CONC INCR CONC

FLWS RATES

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0000	0.1287	0.0000	1.1837	167.81	152.98
2	0.0000	0.2940	0.3834	0.7074	177.17	171.21
3	0.1887	0.2624	0.7777	0.2017	166.31	150.35
4	0.3771	0.7359	0.7222	0.8496	167.12	168.98
5	0.5535	0.8121	0.7777	0.7660	167.74	177.77
6	0.7017	0.8771	0.8843	0.8211	166.74	171.40
7	0.8180	0.9228	0.9213	0.8777	177.74	177.74
8	0.8942	0.9222	0.9213	0.7777	177.74	177.74
9	0.9222	0.9222	0.9213	0.7777	177.74	177.74
10	0.9222	0.0000	0.0000	0.0000	177.74	177.74

FINAL

115706.10

HEAT LOSS REBOILER TRAY

150.50 80.76 76.11 0.2383 0.3804 0.0241

FEED PRODUCT BOTTOMS CONC INCR CONC

FLWS RATES

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0000	0.1287	0.1229	1.1837	167.81	152.98
2	0.1677	0.7777	0.2583	0.9272	167.12	171.21
3	0.3494	0.7052	0.7777	0.7824	177.12	171.21
4	0.5260	0.7777	0.7777	0.7777	177.12	171.21
5	0.7017	0.8771	0.7777	0.7777	177.12	171.21
6	0.7942	0.9131	0.7777	0.7777	177.12	171.21
7	0.8887	0.9222	0.9213	0.9222	177.12	171.21
8	0.9222	0.9222	0.9213	0.9222	177.12	171.21
9	0.9222	0.9222	0.9213	0.9222	177.12	171.21
10	0.9222	0.0000	0.0000	0.0000	177.12	171.21

INITIAL

TABLE 2-2 OPEN LOOP - FEED COEFFICIENT

TABLE S-9 CLOSED LCOP - FEED FLOW - RUN 1

INITIAL						
PLATE	CCNCL	CCNCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0114	0.1352	0.0757	1.1434	73.45	123.05
2	0.0889	0.3542	0.4014	0.8938	196.50	135.80
3	0.2339	0.6047	0.6499	0.8255	209.25	154.98
4	0.4139	0.7633	0.7705	0.9229	228.44	173.49
5	0.5922	0.8458	0.8448	1.0170	96.45	187.33
6	0.7537	0.8962	0.9032	0.8278	110.28	197.03
7	0.8440	0.9309	0.9375	0.7767	119.98	204.06
8	0.9026	0.9591	0.9606	0.9212	127.01	210.00
9	0.9483	0.9776	0.9788	0.9051	132.96	213.72
10	0.9776	0.0000	0.0000	0.0000	136.67	0.00

FLOWS RATES						
FEED	PRODUCT	BOTTOMS	CONCF	CCNCP	CONCB	
150.50	77.05	73.45	0.5060	0.9776	0.0114	
HEAT LOAD		HEAT LOSSES		REBOILER	TRAY	
112445.80				1329.30	590.80	

FINAL						
PLATE	CCNCL	CCNCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0081	0.0962	0.0539	1.1239	64.23	120.76
2	0.0656	0.2463	0.3339	0.8173	184.99	128.94
3	0.1671	0.5157	0.5639	0.8760	193.17	146.74
4	0.3611	0.7236	0.7439	0.8493	210.97	168.25
5	0.5523	0.8217	0.8306	0.8909	100.18	183.66
6	0.7310	0.8859	0.8948	0.8105	115.59	195.81
7	0.8379	0.9275	0.9351	0.7716	127.74	204.39
8	0.9033	0.9572	0.9609	0.8278	136.32	210.70
9	0.9483	0.9758	0.9788	0.7879	142.63	214.43
10	0.9758	0.0000	0.0000	0.0000	146.36	0.00

FLOWS RATES						
FEED	PRODUCT	BOTTOMS	CONCF	CCNCP	CONCB	
132.30	68.07	64.23	0.5060	0.9758	0.0081	
HEAT LOAD		HEAT LOSSES		REBOILER	TRAY	
112445.80				1349.06	599.58	

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

7490.9143

TABLE 2-10 CIRCULAR - FEED FLOW - RUN 5

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAL
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

FEED	PRODUCT	BOTTOMS	CONCE	CONCV	LIQUID	VAL
100.00	67.87	1.43	0.0000	0.0000	0.0000	0.0000
HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS
114376.20	1841.00	1841.00	1841.00	1841.00	1841.00	1841.00

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAL
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

FEED	PRODUCT	BOTTOMS	CONCE	CONCV	LIQUID	VAL
100.00	77.28	73.22	0.0000	0.0000	0.0000	0.0000
HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS
114376.20	1750.40	1750.40	1750.40	1750.40	1750.40	1750.40

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

TABLE 2-II CLESED LCCP - FLOW - RUN 1

PLATE	CONCL	CONCV	CONCE	EFFICI	LIGOL	VAPOUR
1	0.1331	0.2966	0.2522	1.1272	18.21	1.00
2	0.2504	0.2966	0.6113	0.8807	18.21	1.00
3	0.3877	0.2966	0.7710	0.7939	18.21	1.00
4	0.4408	0.2966	0.8168	0.7044	18.21	1.00
5	0.6826	0.2966	0.8726	0.6044	18.21	1.00
6	0.7767	0.2966	0.9193	0.5044	18.21	1.00
7	0.8708	0.2966	0.9442	0.4044	18.21	1.00
8	0.9649	0.2966	0.9690	0.3044	18.21	1.00
9	0.9581	0.2966	0.9816	0.2044	18.21	1.00
10	0.9818	0.2966	0.9900	0.1044	18.21	1.00

FEEL	PRODUCT	BOTTOMS	CONCE	CONCL	TRAY
120.57	16.09	14.41	0.2126	0.291	1.00
106273.30			1104.25		1.00

PLATE	CONCL	CONCV	CONCE	EFFICI	LIGOL	VAPOUR
1	0.1331	0.2966	0.2522	1.1272	18.21	1.00
2	0.2504	0.2966	0.6113	0.8807	18.21	1.00
3	0.3877	0.2966	0.7710	0.7939	18.21	1.00
4	0.4408	0.2966	0.8168	0.7044	18.21	1.00
5	0.6826	0.2966	0.8726	0.6044	18.21	1.00
6	0.7767	0.2966	0.9193	0.5044	18.21	1.00
7	0.8708	0.2966	0.9442	0.4044	18.21	1.00
8	0.9649	0.2966	0.9690	0.3044	18.21	1.00
9	0.9581	0.2966	0.9816	0.2044	18.21	1.00
10	0.9818	0.2966	0.9900	0.1044	18.21	1.00

FEEL	PRODUCT	BOTTOMS	CONCE	CONCL	TRAY
120.10	67.83	82.77	0.2126	0.2918	1.00
14437.25			1104.25		1.00

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

6437.427

TABLE 2-12 CIRCULAR FLOW - STEAM FLOW

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

FEEL	PRODUCT	BOTTOMS	CONCE	CONCV	TRAY
150.30	15.37	15.37	0.0150	0.0150	150.30
HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS
98423.08	1023.33	1023.33	1023.33	1023.33	1023.33

PLATE	CONCL	CONCV	CONCE	EFFICI	LIQUID	VAPOR
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

FEEL	PRODUCT	BOTTOMS	CONCE	CONCV	TRAY
150.30	15.37	15.37	0.0150	0.0150	150.30
HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS	HEAT LOSS
106361.22	1214.22	1214.22	1214.22	1214.22	1214.22

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

6411.1654

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

2816C.65 1086.13 482.3

HEAT LOSS HEAT LOSSES BOILER TRAY

150.CC 36.21 33.39 0.2150 0.1747 C.041

FEED PRODUCT BOTTOMS CONCP CONCP CONCP

FLWS RATES

PLATE	CONCL	CONCV	CONCP	EFFICI	LIQUID	VAPOR
1	C.0415	0.3686	0.1684	0.1682	0.16	0.1684
2	C.0288	0.3686	0.1682	0.1682	0.1684	0.1682
3	C.0373	0.3686	0.1682	0.1682	0.1684	0.1682
4	C.0496	0.3686	0.1682	0.1682	0.1684	0.1682
5	C.0601	0.3686	0.1682	0.1682	0.1684	0.1682
6	C.0583	0.3686	0.1682	0.1682	0.1684	0.1682
7	0.3686	0.3686	0.1682	0.1682	0.1684	0.1682
8	C.0636	0.3686	0.1682	0.1682	0.1684	0.1682
9	0.3686	0.3686	0.1682	0.1682	0.1684	0.1682
10	C.0347	0.3686	0.1682	0.1682	0.1684	0.1682

FINAL

2816C.65 1086.13

HEAT LOSS HEAT LOSSES BOILER TRAY

150.CC 36.21 33.39 0.2150 0.1747 C.041

FEED PRODUCT BOTTOMS CONCP CONCP CONCP

FLWS RATES

PLATE	CONCL	CONCV	CONCP	EFFICI	LIQUID	VAPOR
1	C.0415	0.3686	0.1684	0.1682	0.16	0.1684
2	0.1682	0.3686	0.1682	0.1682	0.1684	0.1682
3	C.0373	0.3686	0.1682	0.1682	0.1684	0.1682
4	C.0442	0.3686	0.1682	0.1682	0.1684	0.1682
5	0.3686	0.3686	0.1682	0.1682	0.1684	0.1682
6	0.3686	0.3686	0.1682	0.1682	0.1684	0.1682
7	C.0610	0.3686	0.1682	0.1682	0.1684	0.1682
8	0.3686	0.3686	0.1682	0.1682	0.1684	0.1682
9	0.3686	0.3686	0.1682	0.1682	0.1684	0.1682
10	C.0304	0.3686	0.1682	0.1682	0.1684	0.1682

INITIAL

AVERAGE OVERALL HEAT TRANSFER COEFFICIENT

98323.65 1101.40 484.25

HEAT LEAD HEAT LOSSES REBUILT

150.00 11.43 18.25 0.2158 0.0811 0.0000

FEEL PRODUCT BOTTOMS CONGE CONCH CONCI

FLWS RATES

PLATE	CONCL	CONCV	CONGE	EFFICI	LIQUID	VAPOR
1	0.0000	0.0000	0.0000	1.1819	18.25	184.40
2	0.0000	0.0000	0.0000	0.0000	18.25	184.40
3	0.0000	0.0000	0.0000	0.0000	18.25	184.40
4	0.0000	0.0000	0.0000	0.0000	18.25	184.40
5	0.0000	0.0000	0.0000	0.0000	18.25	184.40
6	0.0000	0.0000	0.0000	0.0000	18.25	184.40
7	0.0000	0.0000	0.0000	0.0000	18.25	184.40
8	0.0000	0.0000	0.0000	0.0000	18.25	184.40
9	0.0000	0.0000	0.0000	0.0000	18.25	184.40
10	0.0000	0.0000	0.0000	0.0000	18.25	184.40

FINAL

98160.65 1101.40 484.25

HEAT LEAD HEAT LOSSES REBUILT

150.00 18.44 18.25 0.2158 0.0000 0.0000

FEEL PRODUCT BOTTOMS CONGE CONCH CONCI

FLWS RATES

PLATE	CONCL	CONCV	CONGE	EFFICI	LIQUID	VAPOR
1	0.0000	0.0000	0.0000	1.1819	18.25	184.40
2	0.0000	0.0000	0.0000	0.0000	18.25	184.40
3	0.0000	0.0000	0.0000	0.0000	18.25	184.40
4	0.0000	0.0000	0.0000	0.0000	18.25	184.40
5	0.0000	0.0000	0.0000	0.0000	18.25	184.40
6	0.0000	0.0000	0.0000	0.0000	18.25	184.40
7	0.0000	0.0000	0.0000	0.0000	18.25	184.40
8	0.0000	0.0000	0.0000	0.0000	18.25	184.40
9	0.0000	0.0000	0.0000	0.0000	18.25	184.40
10	0.0000	0.0000	0.0000	0.0000	18.25	184.40

INITIAL

TABLE 2-14 CLOSED LOOP - 100% CONTROLLER SET POINT

A P P E N D I X VI
UNSTEADY-STATE PROGRAM AND PREDICTED
TRANSIENT RESPONSE DATA

A sample of the Fortran program written to simulate the unsteady state behavior of the binary distillation column is given in Part A, "Unsteady State Program". Part B, "Open Loop Experiments" of Appendix VI contains the theoretical transient response data for the open loop cases while Parts C, "Closed Loop Experiments - Young" and D, "Closed Loop Experiments - Foxboro" contain the theoretical transient response data for the closed loop cases. However, the model used to calculate the data presented in Part C and Part D used the "Young Equation" and the "Foxboro Equation", respectively, as the equations for the overhead composition controller.

Each part of Appendix VI is divided by a title page with a list of the tables appearing in that section.

A. Unsteady State Program

The program is composed of six subroutines. The subroutines are Main, Proper, Flows, Effici, Deriv, and Tprint. The purpose of each subroutine is as follows:

- 1) Main - This subroutine has the functions of data input, program execution control, autoplotter output and contains "Heun's first method" as the integration routine.
- 2) Proper - As the name implies, this subroutine has the purpose of calculating the system thermodynamic properties. A linear interpolation of the data presented in Appendix II is used.
- 3) Effici - This routine contains the equations for calculating the Murphree liquid efficiencies
- 4) Flows - This routine uses the explicit method of Appendix I to calculate the liquid and vapor flow rates within the column.
- 5) Deriv - This routine contains the equations used to describe the unsteady state component balances for each tray, reboiler and condenser.
- 6) Tprint - This subroutine controls the format of the output.

The variables used in the subroutine "Main" and common to all subroutines are as follows:

XEF	points on the abscissa of the equilibrium curve, weight fraction
YET	points on the ordinate of the equilibrium curve, weight fraction
XHL	points for the abscissa of the enthalpy curve, wt. fraction
HLF	points for the ordinate of the enthalpy curve, wt. fraction
XDL	points for the abscissa of the density curve, wt. fraction
ROLT	points for the ordinate of the density curve, wt. fraction
TLX	points for the abscissa of the reboiler temperature curve, weight fraction
TLY	points for the ordinate of the reboiler temperature curve, °F
EMX	points for the abscissa of the efficiency curve, wt. fraction
EMY	points for the ordinate of the efficiency curve, wt. fraction
QLY	points for the ordinate of the heat loss curve, BTU/hr.
XT	liquid composition, weight fraction
X	liquid composition, weight fraction
YT	vapor composition, weight fraction
YE	vapor equilibrium composition, weight fraction
XTL	liquid composition of condenser used to store the dead time vector, weight fraction
XD	composition of overhead product, weight fraction
XF	composition of feed, weight fraction
LT	liquid flow rate, lbm/hr.
VT	vapor flow rate, lbm/hr.

F	feed flow rate, lbm/hr.
LRFL	reflux flow rate, lbm/hr.
HL	enthalpy of the liquid, BTU/lbm
HLT	enthalpy of the liquid, BTU/lbm
HVT	enthalpy of the vapor, BTU/lbm
HF	enthalpy of the feed, BTU/lbm
W	holdup of the liquid on the trays, lbm
WT	holdup of the liquid on the trays, lbm
DXT	derivative with respect to time of the liquid composition
DW	derivative with respect to time of the holdup on the trays
DHL	derivative with respect to time of the liquid phase enthalpy
QR	heat load to reboiler, BTU/hr.
EM	Murphree liquid efficiency
TR	solution temperature of the reboiler, °F
TS	temperature of the steam in the steam chest, °F
S	steam flow, lbm/hr.
SF	steam flow, lbm/hr.
UA	overall heat transfer coefficient, BTU/hr.°F
AHLO } BHLO }	constants used to calculate the steam condensate enthalpy, BTU/hr.
HSI	enthalpy of the entering steam, BTU/hr.
ERX2	error in composition used in overhead composition
ERX1	control, weight fraction

SUMER	dummy variable in composition controller equation
KP	proportional gain
KINT	integral time, mins.
KTD	derivative time, mins.
DI	time, mins.
VR	volume of liquid in reboiler, ft^3
VC	volume of liquid in condenser, ft^3
VP	volume of liquid on the plates, ft^3
NT	number of trays plus reboiler
NTT	number of trays and reboiler
NPX	number of points used on equilibrium curve function
NPH	number of points used on liquid enthalpy curve
NPD	number of points used on density correlation
LF	feed plate location
NPI	number of trays, plus the reboiler, plus the condenser
NPR	number of points on the liquid temperature of the reboiler curve
KE	dummy variable used in switching
NPS	run number of the particular data being used

Variables Present Only in "Main"

AX	
AY	
TD	dummy variables used to set up the autoplotter
XTD	

Variables Present Only in "Flows"

C	constants in Matrix (Appendix I)
B	constants in Matrix (Appendix I)
FT	left hand side of equation (Appendix I)
SFT	dummy variable used in forming required addition terms
SB	dummy variable used in forming required addition terms
SW	dummy variable used in forming required addition terms
QA	intercept of heat loss correlation
QB	slope of heat loss correlation
QLP	heat loss per tray, BTU/hr.

Variables Present Only in "Effici"

A	intercept of efficiency correlation
B	slope of efficiency correlation
XE	equilibrium liquid composition, weight fraction

IBFTC COLUMN NCDECK

```

C**
C**  DERIVATIVE OF THE ERROR EQUALS DXT(NPI)
C**
0COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20
1),XT(10),
1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
10),F(10),QR,
2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
110),YE(10),
3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1CXT(10)
4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLE(20),DROL
1(20)
5,ITIT(10)
COMMON DT,NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH
REAL XTT(10),KP,KINT,LRFL,HV(10),LT,LX10
REAL AX(500),AY(500,6),XP(500),DX(10),TD(50),XTC(50,10
1)
REWIND 3
1 FORMAT (1X,12I5)
2 FORMAT (1X,F11.6,5F12.6)
29 FORMAT (1X,I5,4F15.8,F10.4)
75 FORMAT (1X,I4,5F13.6)
READ(5,1) NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPR,NPDH
WRITE(6,1)NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPR,NPDH
RAT=32.04/18.016
C**  EQUILIBRIUM DATA
DO 4 J=1,NPX
4 READ (5,5) XEF(J),YEF(J)
C**  LIQUID ENTHALPY DATA
DO 6 J=1,NPH
6 READ(5,5) XHL(J),HLF(J)
5 FORMAT (6X,2F15.8)
C**  LIQUID DENSITY DATA
DO 8 J=1,NPD
8 READ (5,7) XDL(J),ROLT(J)
7 FORMAT (1X,5F10.6)
C**  DERIVATIVES OF FL AND W
DO 12 J=1,NPDH
12 READ (5,2) DXHD(J),DHLE(J),DROL(J)
C**  TEMPERATURE OF THE LIQUID IN REBOILER
READ(5,2) (TLX(N),N=1,NPR)
WRITE(6,2)(TLX(N),N=1,NPR)
READ(5,2) (TLY(N),N=1,NPR)
WRITE(6,2)(TLY(N),N=1,NPR)
C**  CONSTANTS FOR REFLUX FLOW RATE
BRD=ALOG(200./71.)/ALOG(72./10.)
ARD=200./(72.**BRD)
C**  DATA FOR TRANSIENT RUN
DO 35 NR=1,ND
WRITE(6,37)
WRITE(4,37)
37 FORMAT (1F1)

```



```

CTOUT=0.0
CI=0.0
CK=0.0
ERX1=0.0
SUMER=0.0
KE=1
KIT=C
KST=C
READ(5,36) (ITIT(J),J=1,10)
36 FORMAT (1X,10A6)
READ(5,1) LF
READ(5,2) TFIN,STEP,TOUT,KP,KINT,DTD
WRITE(6,2) TFIN,STEP,TOUT,KP,KINT,DTD
READ(5,24) VR,(VP(N),N=2,NTT),VC
WRITE(6,24) VR,(VP(N),N=2,NTT),VC
24 FORMAT (1F,10F7.4)
READ(5,26) SLCC,DT,STEPXD
CT=CT/60.
WRITE(6,26) SLCC,ARD,BRD,DT,STEPXD
SLCC=100./SLCC
WRITE(6,26) SLCC
READ(5,26) UA,AHLO,BHLO,HSI
WRITE(6,26) UA,AHLO,BHLO,HSI
26 FORMAT (6X,4F15.8)
READ(5,14) F(1),STEPF,SF,STEPS,PCS,STEPR,XF,STEPXF,SPG
WRITE(6,14) F(1),STEPF,SF,STEPS,PCS,STEPR,XF,STEPXF,SPG
14 FORMAT (1X,6F9.4,3F7.4)
PC1=PCS
CORR1=1.0+2.5*CTD/KINT
CORA=1.0+0.5*DTD/KINT
CORB=DTD/(KINT*DT*60.)
CORR=CORA+CORB
GAIN=100./KP
WRITE(6,841) CCRR1,CORA,CORB,CORR
C** INITIAL AND FINAL EFFICIENCIES AND HEAT LOSSES
DO 10 N=1,NTT
READ(5,11) EMX(N,1),EMY(N,1),QLY(N,1),EMX(N,2),EMY(N,2),
1),QLY(N,2)
10 WRITE(6,11) EMX(N,1),EMY(N,1),QLY(N,1),EMX(N,2),EMY(N,2),
1),QLY(N,2)
11 FORMAT (1X,2(F11.8,F12.8,F16.8))
C** EXPERIMENTAL TRANSIENT DATA
READ(5,1) NEXP
DO 15 J=1,NEXP
15 READ(5,16) TD(J),(XTD(J,N),N=1,NPI)
16 FORMAT (1X,11F7.4)
C** INITIAL VALUES OF THE LIQUID COMPOSITIONS
READ (5,2) (XT(J),J=1,NPI)
WRITE(6,2) (XT(J),J=1,NPI)
WRITE(6,76)
76 FORMAT (1FK,16F INITIAL VALUES)
C** ENTHALPY OF THE FEED
DO 80 J=9,NPH
IF (XHL(J)-XF) 80,81,82
80 CONTINUE

```

80 CONTINUE

IF (XFL(J)-XF) 80,81,82

GO 80 J=J+1,NPH

C** ENTHALPY OF THE FEED

76 FORMAT (1F,1G4 INITIAL VALUES)

WRITE(6,76)

WRITE(6,75) (XT(J),J=1,NPI)

READ(5,75) (XT(J),J=1,NPI)

C** INITIAL VALUES OF THE LIQUID COMPOSITIONS

76 FORMAT (1X,11F7.4)

15 READ(5,16) (XT(J),J=1,NPI)

CO 15 J=1,NEXP

READ(5,1) NEXP

C** EXPERIMENTAL TRANSIENT DATA

77 FORMAT (1X,2F11.8,12.8,F16.8)

1) GLY(N,2)

10 WRITE(6,11) (EMX(N,1),EMY(1),GLY(N,1),EMX(N,2),EMY(N,2))

1) GLY(N,2)

READ(5,11) (EMX(N,1),EMY(1),GLY(N,1),EMX(N,2),EMY(N,2))

CO 10 N=1,NIT

C** INITIAL AND FINAL EFFICIENCIES AND HEAT LOSSES

WRITE(6,841) CCOR1,COR4,COR4,CCOR

GAIN=100.0/KP

CCOR=CCOR4+CCOR

CCOR=CIC/(KINT*CT*80.1)

CCOR4=1.0+0.2*DTCKINT

CCOR1=1.0+0.2*DTCKINT

PCI=PC2

74 FORMAT (1X,6F9.4,3F7.6)

WRITE(6,141) (1),STEP4,PC1,STEP4,X1,STEP4,2F

741 (2,14) F(1),STEP4,2F,STEP4,PC2,STEP4,X2,STEP4,2F

76 FORMAT (6X,4F15.6)

WRITE(6,26) GA,AHLO,BHLO,H21

READ(5,26) GA,AHLO,BHLO,H21

WRITE(6,26) SLCC

SLCC=100.0/SLCC

WRITE(6,26) SLCC,ARD,PRI,DT,STEPX

CT=CIV60.

READ(5,26) SLCC,CT,STEPXD

74 FORMAT (1F,11F7.4)

WRITE(6,24) V,(VPI(N),N=2,NIT),V

READ(5,24) V,(VPI(N),N=2,NIT),V

WRITE(6,2) TTIN,STEP,TOUT,KP,KIPI,DT

READ(5,2) TTIN,STEP,TOUT,KP,KIPI,DT

READ(5,1) LE

76 FORMAT (1X,10A6)

761 (2,36) (TTTT(J),J=1,10)

K2=C

K1=C

KE=1

SUMPR=C.0

ERX1=C.0

EK=C.0

EI=C.0

ETOUT=...


```

81 HF=HLF(J)
GO TO 34
82 SLOPE=(HLF(J)-HLF(J-1))/(XHL(J)-XHL(J-1))
HF=SLOPE*(XF-XFL(J-1))+HLF(J-1)
34 LT(NPI)=LRFL
XD=XT(NPI)
C** INITIAL VALUES
CALL PROPER
DO 19 N=1,NPI
X(N)=XT(N)
FL(N)=HLT(N)
19 W(N)=WT(N)
CALL EFFICI
LT(NPI)=SQRT(SPG)*ARD*(PCS**BRD)
CALL FLOWS
CALL DERIV
DO 20 N=1,NPI
20 DX(N)=DXT(N)
DO 32 K=1,NPI
WRITE(6,75) K,FVT(K),HL(K),W(K),HF
WRITE(6,75) K,X(K),YE(K),EM(K),DX(K)
32 WRITE(6,75) K,XT(K),YT(K),LT(K),VT(K)
C** EXPERIMENTAL DATA ON TAPE
DO 17 J=1,NEXP
17 WRITE(3,400) TC(J),(XTD(J,N),N=1,NTT)
WRITE(3,401)
C** CALCULATION OF DERIVATIVE AT I+1
I=1
WRITE(6,551)
551 FORMAT (1F1)
GO TO 100
48 DO 45 N=1,NPI
X(N)=XT(N)
XT(N)=XT(N)+DT*DX(N)
45 XTT(N)=XT(N)
CALL PROPER
CALL EFFICI
C** OVERHEAD COMPOSITION CONTROLLER
ERX2=SLCC*(XD-XT(NPI))
850 SUMER=SUMER+(ERX2+ERX1)*DT*30.
CALL FLOWS
CALL DERIV
46 DO 53 N=1,NPI
CXAVE=(DX(N)+DXT(N))/2.
C** NEW X IS CALCULATED
53 XT(N)=X(N)+DT*CXAVE
C** CHECK ON CONVERGENCE
721 KIT=KIT+1
DO 55 N=1,NPI
ERRX=ABS((XT(N)-XTT(N))/XTT(N))
IF (ERRX.GT.0.CC01) GO TO 56
55 CONTINUE
ERX2=SLCC*(XD-XT(NPI))
GO TO 66
C** NEW GUESS OF THE COMPOSITION ON THE TRAYS

```

```

** NEW GUESS OF THE COMPOSITION ON THE TRAY.
GO TO 66
FRXS=SLCG*(X-XI(NPI))
25 CONTINUE
IF (FRXS.GT.1.0001) GO TO 66
FRXS=ABS((XII(N)-XI(N))/XII(N))
GO 25 N=1,NPI
XII=XI+1
** CHECK ON CONVERGENCE
28 XI(N)=X(N)+DT*EXX(N)
** NEW X IS CALCULATED
EXAVE=(EX(N)+DT*XI(N))/2
EXAVE=(EX(N)+DT*XI(N))/2
GO 23 N=1,NPI
CALL DERIV
CALL FLOW2
820 SUMER=SUMER+(FRXS+FRXI)*DT
FRXS=SLCG*(X-XI(NPI))
** OVERHEAD COMPOSITION CONTROL
CALL EFFICI
CALL PROPER
42 XI(N)=XI(N)
42 XI(N)=XI(N)+DT*EXX(N)
X(N)=XI(N)
GO 42 N=1,NPI
GO TO 100
251 FORMAT (1H1)
WRITE(6,251)
I=1
** CALCULATION OF DERIVATIVE AT I+1
WRITE(6,401)
17 WRITE(3,400) T(I),(XID(I,N),N=1,NPI)
GO 17 J=1,NEXP
** EXPERIMENTAL DATA ON TRAY
WRITE(6,25) K,XI(K),YI(K),LT(K),V(K)
WRITE(6,25) K,X(K),YE(K),LE(K),LX(K)
GO 35 K=1,NPI
EX(N)=EXI(N)
GO 20 N=1,NPI
CALL DERIV
CALL FLOW2
LT(NPI)=2*RI(2*PI)*WARD*(PC2*BR1)
CALL EFFICI
19 W(N)=WT(N)
FL(N)=FL(N)
X(N)=XI(N)
GO 19 N=1,NPI
CALL PROPER
** INITIAL VALUES
XD=XI(NPI)
LT(NPI)=LRL
34 LT(NPI)=LRL
H=SLCPE*(X-XL(1))+HFL(1-1)
82 SLCPE=(HFL(1)-HFL(1-1))/XHL(1)-XHL(1-1)
GO TO 34
81 H=HFL(1)

```



```

C**  RESET OF X
C**  CONTROLS NO. OF ITERATIONS
56  IF (KIT.LE.25) GO TO 88
    IF (KIT.LE.30) GO TO 39
    WRITE(6,40)
40  FORMAT (1X,51H KIT EXCEEDED ITERATION LIMIT
1      )
    WRITE(6,771) (XT(N),N=1,NPI)
771  FORMAT (1X,3HXT=,10F12.8)
    WRITE(6,772) (XTT(N),N=1,NPI)
772  FORMAT (1X,4HXTT=,10F12.8)
    GO TO 66
39  DO 90 N=1,NPI
90  XT(N)=(XT(N)+XTT(N))/2.
88  DO 57 N=1,NPI
57  XTT(N)=XT(N)
C**  THERMODYNAMIC PROPERTIES AT I+1
    CALL PROPER
C**  REFLUX FLCW RATE
C**  OVERHEAD COMPOSITION CONTROLLER
    ERX2=SLCC*(XD-XT(NPI))
852  SUMER=SUMER+(ERX2+ERX1)*DT*30.
C**  EFFICIENCIES
    CALL EFFICI
C**  CALCULATION OF LIQUID AND VAPOR FLOWS
    CALL FLOWS
C**  DERIVATIVES
    CALL DERIV
    GO TO 46
C**  OUTPUT
66  DI=DI+DT*60.
C**  INITIAL VALUES RESET
    DO 72 N=1,NTT
    DX(N)=DXT(N)
    W(N)=WT(N)
72  FL(N)=HLT(N)
    PCI=PC
    ERX1=ERX2
    F(1)=STEPF
    SF=STEPS
    XD=STEPXD
27  KIT=C
C**  SETTING UP AUTO PLOTTER
    DTOUT=DTOUT+DT*60.
    IF (DTOUT.LE.TCUT) GO TO 28
    DTOUT=0.0
    WRITE(3,400) DI,(XT(N),N=1,NTT)
C**  CONTROL OF PRINT OUT
28  DK=DK+DT*60.
    IF (DK.LE.STEP) GO TO 48
    DK=0.0
100 CALL TPRINT
C**  CONTROL OF TIME TO FINISH
    IF (DI.GE.TFIN) GO TO 71
    GO TO 48

```



```
71 WRITE(3,4C1)
400 FORMAT (1X,F7.2,10F7.4)
4C1 FORMAT(6H END )
35 CONTINUE
CALL EXIT
END
```


IBFTC PCRPER

SUBROUTINE PROPER

COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20),
XT(10),
1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(10),
F(10),GR,
2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(10),
YE(10),
3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1DXT(10)
4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLF(20),DROL1(20)
5,ITIT(10)
COMMON DT,NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH

C** TEMPERATURE OF THE REBOILER

DO 1 J=1,NPR

IF (TLX(J)-XT(1)) 1,2,3

1 CONTINUE

2 TR=TLY(J)

GO TO 59

3 SLOPE=(TLY(J)-TLY(J-1))/(TLX(J)-TLX(J-1))

TR=SLOPE*(XT(1)-TLX(J-1))+TLY(J-1)

C** EQUILIBRIUM VAPOR COMPOSITION

59 DO 21 N=1,NPI

DO 22 J=1,NPX

IF (XEF(J)-XT(N)) 22,23,24

22 CONTINUE

23 YE(N)=YEF(J)

GO TO 25

24 SLOPE=(YEF(J)-YEF(J-1))/(XEF(J)-XEF(J-1))

YE(N)=SLOPE*(XT(N)-XEF(J-1))+YEF(J-1)

C** ENTHALPY OF LIQUID

25 DO 26 J=1,NPH

IF (XHL(J)-XT(N)) 26,27,28

26 CONTINUE

27 HLT(N)=HLF(J)

GO TO 29

28 SLOPE=(HLF(J)-HLF(J-1))/(XHL(J)-XHL(J-1))

HLT(N)=SLOPE*(XT(N)-XHL(J-1))+HLF(J-1)

C** VOLUMES OF PARTS

29 IF (N.EQ.NPI) GO TO 5

IF (N.GT.1) GO TO 20

VL=VR

GO TO 19

20 VL=VP(N)

GO TO 19

5 VL=VC

C** LIQUID HOLD-UP OF PARTS

19 DO 30 J=1,NPD

IF (XDL(J)-XT(N)) 30,31,32

30 CONTINUE

31 WT(N)=ROLT(J)*62.43*VL

GO TO 21

32 SLOPE=(ROLT(J)-ROLT(J-1))/(XDL(J)-XDL(J-1))


```

      WT(N)=(SLOPE*(XT(N)-XDL(J-1))+ROLT(J-1))*62.43*VL
      IF (WT(N).GT.0.10) GO TO 21
      JJ=J-1
      WRITE(6,704)N,NPI,NPD,WT(N),XT(N),XDL(J),ROLT(J),XDL(J
1J),ROLT(JJ)
704  FORMAT (1X,6HPRCPR,3I5,6F12.6)
21  CONTINUE
      RETURN
      END

```


IBFTC EFF

SUBROUTINE EFFICI

COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20
1),XT(10),
1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
10),F(10),QR,
2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
110),YE(10),
3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1DXT(10)
4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLF(20),DROL
1(20)

5,ITIT(10)

COMMON DT,NT,NIT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH

REAL A(10),B(10),XE(10)

IF (KE.GT.1) GO TO 1

DO 2 N=1,NTT

B(N)=(EMY(N,1)-EMY(N,2))/(EMX(N,1)-EMX(N,2))

2 A(N)=EMY(N,1)-B(N)*EMX(N,1)

C** CHECKS TO SEE THAT X IS IN RANGE

1 DO 10 N=1,NTT

DIFF=EMX(N,2)-EMX(N,1)

IF (DIFF.LT. 0.0) GO TO 14

IF (XT(N).GE.EMX(N,1)) GO TO 11

EM(N)=EMY(N,1)

GO TO 10

11 IF (XT(N).LE.EMX(N,2)) GO TO 12

EM(N)=EMY(N,2)

GO TO 10

14 IF (XT(N).LE.EMX(N,1)) GO TO 13

EM(N)=EMY(N,1)

GO TO 10

13 IF (XT(N).GE.EMX(N,2)) GO TO 12

EM(N)=EMY(N,2)

GO TO 10

12 EM(N)=A(N)+B(N)*XT(N)

10 CONTINUE

DO 3 N=1,NTT

M=N+1

XE(N)=(XT(N)-XT(M))/EM(N)+XT(M)

DO 7 J=1,NPX

IF (XEF(J)-XE(N)) 7,8,9

7 CONTINUE

8 YT(N)=YEF(J)

GO TO 3

9 SLOPE=(YEF(J)-YEF(J-1))/(XEF(J)-XEF(J-1))

YT(N)=SLOPE*(XE(N)-XEF(J-1))+YEF(J-1)

3 HVT(N)=1143.-613.8*YT(N)

IF (WT(1).GT.0.10) GO TO 702

WRITE(6,704) VR,VP,VC

704 FORMAT (1X,6HEFFICI,4F12.6)

702 CONTINUE

RETURN

END

IBFTC FLOWS

SUBROUTINE FLOWS

```

COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20
1),XT(10),
1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
10),F(10),QR,
2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
110),YE(10),
3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1DXT(10)
4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLF(20),DROL
1(20)

```

```

5,ITIT(10)

```

```

COMMON DT,NT,NTT,NPX,NPH,NPC,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH

```

```

REAL C(10),B(10),DW(10),DHL(10),FT(10),SFT(10),SB(10),
1SW(10),LT,L

```

```

1,QLP(10),QA(10),QB(10)

```

```

C** HEAT LOSSES

```

```

IF (KE.GT.1) GO TO 18

```

```

KE=KE+1

```

```

DO 16 N=1,NTT

```

```

QB(N)=(QLY(N,1)-QLY(N,2))/(EMX(N,1)-EMX(N,2))

```

```

16 QA(N)=QLY(N,1)-QB(N)*EMX(N,1)

```

```

18 DO 17 N=1,NTT

```

```

17 GLP(N)=QA(N)+QB(N)*XT(N)

```

```

C** TEMPERATURE OF STEAM

```

```

TS=(SF*(HSI-AHLO)+UA*TR)/(UA+BHLO*SF)

```

```

C** HEAT ADDED

```

```

QR=UA*(TS-TR)

```

```

QP=QR

```

```

I=1

```

```

NL=NTT-1

```

```

C** VAPOR AND LIQUID FLOW RATES

```

```

DO 1 N=1,NL

```

```

M=N+1

```

```

C(N)=(HLT(M)-HVT(N))

```

```

1 B(N)=(HLT(N)-HLT(M))

```

```

C(NTT)=-(HVT(NTT)-HLT(NTT))

```

```

C** DERIVATIVES OF FL AND WT

```

```

DO 35 N=1,NTT

```

```

DW(N)=(WT(N)-W(N))/DT

```

```

35 DHL(N)=(HLT(N)-FL(N))/DT

```

```

38 SW(NTT)=0.0

```

```

DO 3 N=2,NTT

```

```

J=NTT+1-N

```

```

K=NTT+2-N

```

```

3 SW(J)=SW(K)+DW(K)

```

```

M=NTT+1

```

```

DO 4 N=1,NL

```

```

IF (N.EQ.1) GO TO 5

```

```

IF (N.EQ.LF) GO TO 6

```

```

IF (N.GT.LF) GO TO 7

```

```

FT(N)=WT(N)*DHL(N)-B(N)*(SW(N)-F(I)-LT(M))+QLP(N)

```

```

GO TO 4

```

```

      GO TO 4
      FT(N)=WT(N)*DHL(N)-R(N)*(2*F(N)-F(1)-F(N))+GLP(N)
      IF (N.GT.LE) GO TO 7
      IF (N.EQ.LE) GO TO 6
      IF (N.EQ.1) GO TO 5
      SW(J)=SW(K)+DW(K)
      N=NTI+1
      K=NTI+2-N
      J=NTI+1-N
      DO 3 N=2,NTI
      SW(NTI)=C.C
      35 CHL(N)=(FLT(N)-FLT(N))\DT
      EW(N)=(WT(N)-WT(N))\DT
      DO 35 N=1,NTI
      36 37 N=1,NTI
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      284 285 N=1,NTI
      285 286 N=1,NTI
      286 287 N=1,NTI
      287 288 N=1,NTI
      288 289 N=1,NTI
      289 290 N
```



```

5 FT(N)=WT(N)*DHL(N)-B(N)*(SW(N)-F(I)-LT(M))-QP+QLP(N)
  GO TO 4
6 FT(N)=WT(N)*DHL(N)-B(N)*(SW(N)-LT(M))-F(I)*(HF-HLT(N))
  1+QLP(N)
  GO TO 4
7 FT(N)=WT(N)*DHL(N)-B(N)*(SW(N)-LT(M))+QLP(N)
4 CONTINUE
  FT(NTT)=WT(NTT)*DHL(NTT)-LT(M)*(HLT(M)-HLT(NTT))+QLP(N
  1TT)
  ACC=C.0
  DO 10 N=1,NTT
    SFT(N)=ACC+FT(N)
10  ACC=SFT(N)
    ACC=C.0
    DO 11 N=1,NL
      SB(N)=ACC+B(N)
11  ACC=SB(N)
    VT(NTT)=SFT(NTT)/(C(NTT)+SB(NL))
    DO 12 N=1,NL
12  VT(N)=(SFT(N)-SB(N)*VT(NTT))/C(N)
    DO 13 N=1,NTT
      K=NTT+1-N
      J=K-1
      M=K+1
      IF (K.EQ.LF) GO TO 14
      IF (N.EQ.NTT) GO TO 15
      LT(K)=VT(J)+LT(M)-VT(K)-DW(K)
      GO TO 13
14  LT(K)=VT(J)+LT(M)-VT(K)-DW(K)+F(I)
      GO TO 13
15  LT(K)=LT(M)-VT(K)-DW(K)
13 CONTINUE
  IF (WT(1).GT.0.10) GO TO 702
  WRITE(6,704) VR,VP,VC
704 FORMAT (1X,6HFLWS ,4F12.6)
702 CONTINUE
  RETURN
  END

```

```

2 FT(N)=WT(N)*DHL(N)-B(N)*(24(N)-L1(N)-L1(N))+GLP(N)
GC TC 4
6 FT(N)=WT(N)*DHL(N)-B(N)*(24(N)-L1(N)-L1(N))+GLP(N)
GC TC 4
7 FT(N)=WT(N)*DHL(N)-B(N)*(24(N)-L1(N)-L1(N))+GLP(N)
4 CONTINUE
FT(NIT)=WT(NIT)*DHL(NIT)-L1(NIT)*H1(NIT)-H1(NIT))+GLP(N)
NIT
AEC=C.0
GC TC 1, NIT
24(N)=AEC+FT(N)
10 AEC=24(N)
AEC=C.0
GC TC 1, NIT
24(N)=AEC+FT(N)
11 AEC=24(N)
VT(NIT)=24(NIT)\C(NIT)+24(NIT)
GC TC 1, NIT
12 VT(N)=(24(N)-24(N)*VT(NIT))\C(NIT)
GC TC 1, NIT
K=NIT+1-N
J=K-1
M=K+1
IF (K.EG.LF) GC TC 14
IF (A.EG.NIT) GC TC 12
LI(K)=VT(J)+LT(M)-VT(K)-DM(K)
GC TC 13
14 LT(K)=VT(J)+LT(M)-VT(K)-DM(K)+F(1)
GC TC 13
12 LT(K)=LT(M)-VT(K)-DM(K)
13 CONTINUE
IF (WT(1).GT.0.1) GO TO 14
WRITE(6,764) M,AP,VC
764 FORMAT (1X,6F10.2, 4F12.0)
702 CONTINUE
RETURN
END

```


IBFTC INTEG

SUBROUTINE DERIV

```

COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),RCLT(20
1),XT(10),
1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
10),F(10),QR,
2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
110),YE(10),
3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1DXT(10)
4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLF(20),DROL
1(20)
5,ITIT(10)
COMMON DT,NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH

```

REAL LT

I=1

C** DERIVATIVES

48 DO 50 N=1,NTT

M=N+1

J=N-1

DTW=1./WT(N)

IF (N.EQ.1) GO TO 51

IF (N.EQ.LF) GO TO 52

VTP=VT(N)*(YT(N)-XT(N))

DXT(N)=DTW*(VT(J)*(YT(J)-XT(N))+LT(M)*(XT(M)-XT(N))-VT
1P)

GO TO 50

51 DXT(N)=DTW*(LT(M)*(XT(M)-XT(N))-VT(N)*(YT(N)-XT(N)))

GO TO 50

52 FXF=F(I)*(XF-XT(N))

VTP=VT(N)*(YT(N)-XT(N))

DXT(N)=DTW*(VT(J)*(YT(J)-XT(N))+LT(M)*(XT(M)-XT(N))-VT
1P+FXF)

50 CONTINUE

C** CONDENSER

DXT(NPI)=(VT(NTT)*(YT(NTT)-XT(NPI)))/WT(NPI)

IF (WT(1).GT.0.10) GO TO 702

WRITE(6,704) VR,VP,VC

704 FORMAT (1X,6HDERIV ,4F12.6)

702 CONTINUE

RETURN

END

```

END
RETURN
305 CONTINUE
304 FORMAT (X,6HDERIV,4F12.6)
WRITE(6,7CA) VR,VP,VC
IF (WT(1).LT(.1)) GO TO 303
EXT(NPI)=(VT(NIT)*(Y(NIT)-XT(NPI)))/WT(NPI)
**
CONFESER
30 CONTINUE
IP+EXI
EXT(N)=DWT*(VT(J)*(Y(J)-XT(N))+LT(M)*(XI(N)-XT(N))-VT
VIP=VT(N)*(Y(N)-XT(N))
32 EXF=F(1)*(XF-XT(N))
30 GO TO 30
31 EXT(N)=DWT*(LT(M)*(XT(N)-XT(N))-VT(N)*(Y(N)-XT(N)))
30 GO TO 30
IP)
CXI(N)=DWT*(VT(J)*(Y(J)-XT(N))+LT(M)*(XI(N)-XT(N))-VT
VIP=VT(N)*(Y(N)-XT(N))
IF (N.EQ.LP) GO TO 32
IF (N.EQ.1) GO TO 31
ETW=1./WT(N)
J=N-1
N=N+1
48 CC SC N=1,NTT
**
DERIVATIVES
I=1
REAL LT
INPR
COMMON CT,NT,NIT,NPX,NPH,NPI,IND,LI,NPI,NPR,NPT,NPRKT
2,1111111
I(SC)
4,CI,VP,VP(IG),VC,ELY(10,5),ERXS,DXH(15),DHLF(50),
TEXT(10)
3EM(10),JN,2(2),T2,UA,2I,UB,RAI,APL,8HLL,F21,AA,AT,
110),YE(10),
2X(10),EMX(10,5),EMY(10,5),1LX(11),1LY(10),UAX(10),
10),F(10),AA,
1YT(10),LT(10),VT(10),HLT(10),HAT(10),WT(10),H(10),HLL
1),XI(10),
COMMON XEF(30),YEF(30),XHL(50),HLE(50),X,LL(50),XLL(10)
SUBROUTINE DERIV
1BFC INTEG

```


IBFTC APRINT

SUBROUTINE TPRINT

COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20
1),XT(10),

1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
10),F(10),GR,

2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
110),YE(10),

3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1DXT(10)

4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLF(20),DROL
1(20)

5,ITIT(10)

COMMON DT,NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH

1 FORMAT (1F1)

3 FORMAT (1F)

4 FORMAT (1FS)

5 FORMAT (1F3)

KK=KK+1

IF (KK.GT.1) GO TO 7

WRITE(6,1)

WRITE(4,1)

WRITE(6,10) (ITIT(J),J=1,10)

WRITE(4,10) (ITIT(J),J=1,10)

10 FORMAT (1HK,15X,1CA6)

GO TO 100

7 WRITE(6,4)

WRITE(4,4)

KK=0

100 WRITE(6,67) DI

WRITE(4,67) DI

67 FORMAT (1HK,25F

TIME =,F7.2)

WRITE(6,3)

WRITE(4,3)

WRITE(6,62)

WRITE(4,62)

62 FORMAT (1FS,12X,61HPLATE CONCX CONCV EFFICI LIQUID
1VAPOR HOLD-

1LP DERIVATIVE)

DO 63 N=1,NPI

WRITE(4,64) N,XT(N),YT(N),EM(N),LT(N),VT(N),WT(N),DXT(
1N)

63 WRITE(6,64) N,XT(N),YT(N),EM(N),LT(N),VT(N),WT(N),DXT(
1N)

64 FORMAT (13X,15,3F7.4,3F7.2,F10.6)

WRITE(6,121)

WRITE(4,121)

121 FORMAT (1HJ,11X,46H REFLUX ERROR FEED FEED
1CCNC.)

WRITE(6,2) LT(NPI),ERX2,F(1),XF

WRITE(4,2) LT(NPI),ERX2,F(1),XF

2 FORMAT (1HJ,14X,F7.2,2X,F7.4,2X,F7.2,4X,F7.4)

WRITE(6,3)

WRITE(4,3)


```

      WRITE(6,86)
      WRITE(4,86)
86  FORMAT (1H ,12X,56H      STEAM      TEMPERATURE      CO
1EFFICIENT
1HEAT LOAD)
      WRITE(6,87)
      WRITE(4,87)
87  FORMAT (1H5,12X,46H      FLOW      REBOILER      STEAM
1
)
      WRITE(6,85) SF,TR,TS,UA,QR
      WRITE(4,85) SF,TR,TS,UA,QR
85  FORMAT (1H ,12X,3(2X,F7.2),2(2X,F12.2))
      IF (WT(1).GT.0.10) GO TO 702
      WRITE(6,704) VR,VP,VC
704  FORMAT (1X,6HTPRINT,4F12.6)
702  CONTINUE
      RETURN
      END

```

```

86 FORMAT (1F,1SX,2E1)
WRITE(6,86)
WRITE(4,86)
TEMPERAT STEAM
EFFICIENT
HEAT LOAD
WRITE(6,87)
WRITE(4,87)
87 FORMAT (1F,1SX,4E4)
FLOW RECORDER 211
)
WRITE(6,85) 21,TR,TS,UA,VR
WRITE(4,85) 21,TR,TS,UA,VR
85 FORMAT (1F,1SX,3(SX,F12.5),2(SX,F12.5))
IF (WT(1).LT.0.10) GO TO 705
WRITE(6,704) VR,VP,VC
704 FORMAT (1X,4THPRINT,F12.6)
705 CONTINUE
RETURN
END
```

Symbols Used in Tables U-1 Through U-20

TIME	time in minutes from step perturbation
PLATE	tray or plate number
CONCX	composition of tray solution, weight fraction
CONCV	composition of vapor off the tray, weight fraction
EFFICI	Murphree Liquid Efficiencies
LIQUID	liquid flow rate off the tray, lbm/hr.
VAPOR	vapor flow rate off the tray, lbm/hr.
HOLDUP	weight of solution on the tray, lbm.
DERIVATIVE	rate of change of tray solution composition with time, weight fraction/hr.
REFLUX	reflux flow rate, lbm/hr.
ERROR	difference between desired overhead product composition and that actually present
FEED	feed flow rate, lbm/hr.
FEED CONC	feed composition, weight fraction
COEFFICIENT	heat transfer coefficient, BTU/hr. ^{°F}
HEAT LOAD	reboiler heat duty, BTU/hr.
TEMPERATURE	Reboiler, ^{°F}
TEMPERATURE	Steam, ^{°F}

B. Open Loop Experiments

<u>Table</u>	<u>Title</u>
U-1	Open Loop - Step in Feed Flow - Run 1
U-2	Open Loop - Step in Feed Flow - Run 2
U-3	Open Loop - Step in Reflux Flow - Run 1
U-4	Open Loop - Step in Reflux Flow - Run 2
U-5	Open Loop - Step in Steam Flow - Run 1
U-6	Open Loop - Step in Steam Flow - Run 2
U-7	Open Loop - Step in Feed Composition - Run 1
U-8	Open Loop - Step in Feed Composition - Run 2

TABLE U-1 OPEN LCOP - STEP IN FEED FLCW - RUN 1

TIME = C.CC

PLATE CCNCX CCNCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	C.CC8C	C.C389	C.9C30	62.83	116.39	14.94	0.000001
2	C.C281	0.1281	C.8773	179.22	120.58	3.87	0.000002
3	C.C87C	0.3427	0.8861	183.41	132.52	3.84	0.000005
4	0.2351	0.6126	C.7342	195.35	153.41	3.75	0.000007
5	C.3281	0.7C87	0.8994	83.94	162.71	3.68	0.000004
6	C.5242	0.8C54	0.8499	93.24	176.46	3.52	0.000002
7	C.7C74	0.8773	0.8297	106.99	189.15	3.35	-0.000000
8	0.8314	0.922C	C.7279	119.68	197.69	3.22	-0.000001
9	C.9C34	0.9564	0.8235	128.23	204.56	3.15	-0.000001
1C	0.9564	C.CC0C	C.CC0C	135.09	0.00	2.86	-0.000001

REFLUX ERRCR FEED FEED CONC.

135.09 C.CC0C 132.3C 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

115.91 2C5.34 221.28 7010.44 111760.41

TIME = 5.0C

PLATE CCNCX CCNCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	C.C114	C.C585	C.9207	83.53	117.59	14.94	0.034185
2	C.C415	0.1882	0.8772	201.05	124.18	3.87	0.124778
3	0.1219	0.4241	0.8639	207.57	138.11	3.82	0.325766
4	C.2789	0.6660	C.7741	221.31	158.81	3.72	0.445091
5	0.3766	C.7433	C.9150	91.19	167.21	3.65	0.676673
6	C.5565	0.8205	0.8492	99.05	178.80	3.49	0.575790
7	0.7197	0.8821	0.8253	110.12	189.74	3.33	0.323284
8	C.8346	0.9239	C.7343	120.75	197.68	3.22	0.108979
9	0.9C45	0.9570	0.8248	128.58	204.25	3.15	0.048396
1C	0.9567	C.CC0C	C.CC0C	135.09	0.00	2.86	0.023048

REFLUX ERRCR FEED FEED CONC.

135.09 -C.C255 150.5C 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

115.91 2C4.64 220.59 7010.44 111812.74

TABLE 0-1 OPEN LOOP - STEP IN FEED FLOW - RUN 1

TIME = 0.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	HOT - UP	DERIVATIVE
10	0.9564	0.0000	0.0000	137.09	1.00	2.86 -0.000001
9	0.9014	0.9564	0.8535	158.23	204.56	1.15 -0.000001
8	0.8314	0.9251	0.7579	119.69	197.69	1.55 -0.000001
7	0.7074	0.8573	0.8297	107.77	189.15	1.35 -0.000000
6	0.5245	0.8024	0.8499	114.44	176.44	3.55 0.000005
5	0.3281	0.7087	0.8994	83.94	165.71	1.68 0.000004
4	0.2321	0.7121	0.7121	192.35	133.77	1.75 0.000007
3	0.0870	0.3457	0.7761	183.41	135.25	1.84 0.000005
2	0.0281	0.1281	0.8773	179.25	150.58	3.87 0.000005
1	0.0080	0.0380	0.9880	65.83	116.75	14.94 0.000001
REFLX	135.09	135.34	135.34	0.5060		
STEAM						
RECFLW						
TEMPERATURE						
COEFFICIENT						
FAT LOAD						
112.91	204.64	250.29	4010.44	11815.74		

TIME = 2.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	HOT - UP	DERIVATIVE
10	0.9567	0.0000	0.0000	137.09	1.00	2.86 0.023048
9	0.9014	0.9567	0.8548	158.23	204.56	1.15 0.049306
8	0.8314	0.9259	0.7761	119.69	197.69	3.55 0.108479
7	0.7074	0.8523	0.8253	110.15	189.74	3.33 0.333284
6	0.5265	0.8025	0.8495	99.05	178.80	3.44 0.757901
5	0.3166	0.7433	0.9150	91.19	167.21	0.670673
4	0.2189	0.6660	0.7761	221.3	158.91	3.75 0.45091
3	0.1219	0.4764	0.8633	207.77	138.11	0.353766
2	0.0415	0.1607	0.8775	179.77	154.11	0.154777
1	0.0114	0.0201	0.9207	83.53	117.59	14.94 0.034185
REFLX	135.09	150.20	150.20	0.5060		
STEAM						
RECFLW						
TEMPERATURE						
COEFFICIENT						
FAT LOAD						
112.91	204.64	250.29	4010.44	11815.74		

TABLE U-1 OPEN LCOP - STEP IN FEED FLCW - RUN 1

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0138	C.0740	C.9333	82.98	118.54	14.93	0.028546
2	C.0514	C.2271	C.8771	201.46	126.59	3.86	0.126795
3	C.1471	C.4708	C.8479	209.44	141.59	3.81	0.275725
4	C.3109	0.6925	C.8032	224.28	161.90	3.70	0.352349
5	C.4291	C.7716	C.9319	93.82	171.32	3.60	0.559663
6	C.6048	0.8402	0.8483	102.75	182.24	3.45	0.549713
7	C.7481	0.8929	0.8152	113.14	191.80	3.31	0.327374
8	C.8467	C.9305	C.7582	122.37	198.98	3.21	0.158433
9	C.9111	0.9601	C.8317	129.39	204.78	3.14	0.095382
10	0.9590	C.0000	C.0000	135.09	0.00	2.85	0.078567

REFLUX	ERRCR	FEED	FEED CONC.
--------	-------	------	------------

135.09	-0.2588	150.50	0.5060
--------	---------	--------	--------

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
---------------	-------------------------	-------	-------------	-----------

115.91	204.18	220.13	7010.44	111846.92
--------	--------	--------	---------	-----------

TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0159	C.0887	C.9446	81.14	119.41	14.93	0.022210
2	C.0609	0.2579	0.8770	200.50	128.52	3.86	0.102212
3	C.1678	C.5061	0.8348	209.55	144.42	3.80	0.221893
4	C.3370	0.7108	C.8270	225.31	164.27	3.68	0.270784
5	0.4697	C.7919	C.9450	94.45	174.98	3.57	0.427768
6	C.6443	0.8555	0.8475	104.79	185.59	3.41	0.409933
7	C.7727	0.9025	C.8064	115.01	194.31	3.28	0.264829
8	C.8596	C.9372	C.7837	123.46	201.00	3.19	0.146820
9	0.9191	0.9639	C.8402	130.00	206.19	3.13	0.093530
10	0.9626	C.0000	C.0000	135.09	0.00	2.85	0.088396

REFLUX	ERRCR	FEED	FEED CONC.
--------	-------	------	------------

135.09	-0.6198	150.50	0.5060
--------	---------	--------	--------

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
---------------	-------------------------	-------	-------------	-----------

115.91	203.77	219.73	7010.44	111877.36
--------	--------	--------	---------	-----------

TABLE 0-1 OPEN LOOP - 15% IN FEED FLOW - 1000

TIME = 10.00

PLATE CONC. CONC. EFFICI. LIQUID VAPOR H/L - UP DERIVATIVE

1	0.0138	0.114	0.9333	85.98	118.94	14.93	0.058598
2	0.0214	0.2271	0.8771	201.46	126.95	14.93	0.150149
3	0.01471	0.47	0.8473	209.44	141.95	14.93	0.232152
4	0.0319	0.622	0.824	224.58	161.96	14.93	0.323349
5	0.04291	0.7716	0.8319	93.85	171.83	14.93	0.323349
6	0.0648	0.8401	0.8483	105.75	182.54	14.93	0.247113
7	0.07491	0.9229	0.87	113.16	191.80	14.93	0.17314
8	0.08464	0.9902	0.8985	12.37	199.9	14.93	0.128433
9	0.09111	0.9991	0.8914	129.39	204.79	14.93	0.092385
10	0.0999	0.9999	0.9000	137.99	209.9	14.93	0.18291

REFLUX ERR. FEED FEED CONC.

132.09 -0.258 1.50 C.2060

STEAM FLOW REFLUX STEAM TEMPERATURE COEFFICIENT HEAT LOAD

112.21 204.18 220.13 201.94 1184.1

TIME = 12.00

PLATE CONC. CONC. EFFICI. LIQUID VAPOR H/L - UP DERIVATIVE

1	0.0159	0.114	0.9446	11.14	119.41	14.93	0.058598
2	0.0214	0.2271	0.8770	200.90	126.95	14.93	0.150149
3	0.01678	0.47	0.8348	209.44	141.95	14.93	0.232152
4	0.03310	0.622	0.824	224.58	161.96	14.93	0.323349
5	0.04624	0.7716	0.8320	93.85	171.83	14.93	0.323349
6	0.0648	0.8401	0.8483	105.75	182.54	14.93	0.247113
7	0.07491	0.9229	0.8704	113.16	191.80	14.93	0.17314
8	0.08464	0.9902	0.8937	12.37	199.9	14.93	0.128433
9	0.09191	0.9991	0.8905	130.00	204.79	14.93	0.092385
10	0.0999	0.9999	0.9000	137.99	209.9	14.93	0.18291

REFLUX ERR. FEED FEED CONC.

132.09 -0.410 120.90 C.2060

STEAM FLOW REFLUX STEAM TEMPERATURE COEFFICIENT HEAT LOAD

112.21 203.77 219.73 201.94 1184.1

TABLE U-1 OPEN LOOP - STEP IN FEED FLOW - RUN 1

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0176	0.1005	0.9533	79.85	120.12	14.92	0.018424
2	0.0688	0.2831	0.8770	199.94	130.13	3.85	0.087414
3	0.1851	0.5314	0.8238	209.90	146.55	3.78	0.192513
4	0.3563	0.7253	0.8446	226.20	166.05	3.66	0.212087
5	0.5021	0.8063	0.9554	95.03	177.52	3.54	0.356643
6	0.6736	0.8667	0.8469	106.18	187.90	3.38	0.309239
7	0.7921	0.9101	0.7995	116.26	196.07	3.26	0.202530
8	0.8708	0.9428	0.8058	124.23	202.43	3.18	0.120037
9	0.9263	0.9672	0.8478	130.46	207.14	3.13	0.078594
10	0.9661	0.0000	0.0000	135.09	0.00	2.85	0.077184

REFLUX	ERRCR	FEED	FEED CONC.
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135.09	-0.9675	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	203.46	219.42	7010.44	111900.83
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0190	0.1098	0.9606	78.60	120.69	14.92	0.014647
2	0.0751	0.3032	0.8769	199.26	131.44	3.85	0.067781
3	0.1992	0.5517	0.8148	209.98	148.40	3.78	0.153451
4	0.3721	0.7363	0.8589	226.83	167.65	3.65	0.175257
5	0.5280	0.8179	0.9637	95.45	179.75	3.52	0.252925
6	0.6965	0.8753	0.8465	107.31	189.89	3.36	0.240499
7	0.8070	0.9160	0.7942	117.22	197.62	3.25	0.157087
8	0.8796	0.9471	0.8233	124.79	203.73	3.17	0.093897
9	0.9321	0.9698	0.8539	130.79	208.09	3.12	0.060928
10	0.9689	0.0000	0.0000	135.09	0.00	2.84	0.060962

REFLUX	ERRCR	FEED	FEED CONC.
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135.09	-1.2537	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	203.19	219.16	7010.44	111920.63
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TABLE U-1 OPEN LOOP - STEP IN FEED FLOW - RUN 1

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0201	0.1173	0.9663	77.59	121.16	14.92	0.011974
2	0.0803	0.3196	0.8769	198.72	132.49	3.85	0.057777
3	0.2109	0.5672	0.8074	210.03	149.85	3.77	0.130853
4	0.3847	0.7437	0.8704	227.30	168.77	3.64	0.125742
5	0.5460	0.8263	0.9695	95.62	181.47	3.50	0.181633
6	0.7138	0.8818	0.8461	108.15	191.44	3.34	0.176947
7	0.8184	0.9205	0.7902	117.94	198.84	3.24	0.118269
8	0.8865	0.9504	0.8369	125.23	204.74	3.17	0.072222
9	0.9365	0.9718	0.8586	131.05	208.84	3.11	0.046737
10	0.9712	0.0000	0.0000	135.09	0.00	2.84	0.046802

REFLUX	ERROR	FEED	FEED CONC.
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135.09	-1.4757	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.99	218.95	7010.44	111935.97
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0210	0.1237	0.9711	76.85	121.55	14.92	0.009550
2	0.0846	0.3335	0.8769	198.38	133.39	3.84	0.048999
3	0.2208	0.5791	0.8011	210.19	150.97	3.76	0.105299
4	0.3942	0.7493	0.8790	227.70	169.67	3.63	0.103068
5	0.5599	0.8317	0.9739	95.82	182.57	3.49	0.147292
6	0.7257	0.8863	0.8459	108.58	192.50	3.33	0.117207
7	0.8266	0.9238	0.7872	118.40	199.73	3.23	0.080038
8	0.8917	0.9528	0.8471	125.54	205.49	3.16	0.052593
9	0.9399	0.9733	0.8622	131.25	209.37	3.11	0.034942
10	0.9729	0.0000	0.0000	135.09	0.00	2.84	0.036756

REFLUX	ERROR	FEED	FEED CONC.
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135.09	-1.6503	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.84	218.81	7010.44	111946.76
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TIME = 30.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	H LD-UP	DERIVATIVE
1	0.0201	0.1173	0.9663	0.7729	151.16	0.019174
2	0.0111	0.3196	0.8166	197.15	135.44	0.027117
3	0.0102	0.7177	0.8074	210.03	149.82	0.130823
4	0.03647	0.7437	0.8704	227.30	161.17	0.122745
5	0.0444	0.8065	0.8662	227.62	161.47	0.181633
6	0.0413	0.8818	0.8641	108.15	161.44	0.176947
7	0.08164	0.9202	0.7902	117.94	168.94	0.118269
8	0.08662	0.9204	0.7115	122.23	204.74	0.022222
9	0.07777	0.9718	0.7000	131.02	208.89	0.046777
10	0.07112	0.9001	0.6000	132.09	0.00	0.046802

REFLEX ERROR FEED FEED CONC

132.02 -1.4757 12.20 0.2060

TEMPERATURE REFLUX STEAM COEFFICIENT HEAT LOAD

112.91 202.89 218.95 2010.44 111932.97

TIME = 35.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	H LD-UP	DERIVATIVE
1	0.0210	0.1237	0.7711	0.7682	151.16	0.009229
2	0.00846	0.3337	0.8769	198.36	137.39	0.048229
3	0.02208	0.5791	0.8011	210.19	150.97	0.102297
4	0.03642	0.7493	0.8790	227.11	169.67	0.103061
5	0.05269	0.8317	0.8739	227.62	182.27	0.147292
6	0.07227	0.8863	0.8429	108.15	192.20	0.117217
7	0.07266	0.9238	0.7872	117.94	199.73	0.080038
8	0.07217	0.9228	0.6471	122.24	207.49	0.077944
9	0.06222	0.9733	0.6000	131.02	202.37	0.044945
10	0.07125	0.9000	0.6000	132.09	0.00	0.036729

REFLEX ERROR FEED FEED CONC

132.02 -1.6503 12.20 0.2060

TEMPERATURE REFLUX STEAM COEFFICIENT HEAT LOAD

112.91 202.84 218.81 2010.44 111942.77

TABLE U-1 OPEN LCOP - STEP IN FEED FLOW - RUN 1

TIME = 40.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0217	0.1289	C.9748	76.32	121.87	14.92	0.007839
2	C.0882	0.3448	0.8768	198.17	134.13	3.84	0.038339
3	0.2289	0.5887	C.7959	210.41	151.93	3.76	0.088844
4	0.4019	0.7538	0.8860	228.15	170.37	3.63	0.083818
5	C.5705	0.8358	C.9774	96.02	183.39	3.48	0.112858
6	C.7340	0.8894	0.8457	108.94	193.25	3.32	0.086481
7	C.8323	0.9261	0.7852	118.71	200.36	3.22	0.058307
8	0.8955	0.9546	0.8546	125.76	206.02	3.16	0.038028
9	0.9424	0.9744	C.8648	131.38	209.76	3.11	0.027057
10	0.9741	0.0000	C.0000	135.09	0.00	2.84	0.023031

REFLUX	ERRCR	FEED	FEED CONC.
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135.09	-1.7715	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.73	218.70	7010.44	111955.32
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TIME = 45.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0223	0.1335	C.9781	75.89	122.15	14.91	0.007329
2	C.0914	0.3532	0.8768	198.03	134.69	3.84	0.034233
3	0.2351	0.5961	0.7920	210.54	152.75	3.75	0.067845
4	0.4079	0.7573	0.8915	228.56	170.96	3.62	0.060792
5	C.5788	0.8389	C.9800	96.21	184.06	3.47	0.085211
6	C.7403	0.8918	0.8456	109.24	193.84	3.31	0.064873
7	0.8365	0.9279	C.7837	118.96	200.85	3.22	0.043279
8	0.8982	0.9559	0.8600	125.93	206.44	3.15	0.028398
9	0.9442	0.9752	0.8667	131.48	210.07	3.11	0.018110
10	0.9750	0.0000	C.0000	135.09	0.00	2.84	0.019107

REFLUX	ERRCR	FEED	FEED CONC.
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135.09	-1.8622	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.63	218.60	7010.44	111962.81
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TIME = 40.00

PLATE	CLINX	CONCA EFFICI	LIQUID	VAPOUR	HEAT LOSS	EFFICIENCY
1	0.0017	0.1589	1.9741	181.93	14.91	0.000000
2	0.0018	0.1548	1.8758	180.17	14.91	0.000000
3	0.0018	0.1587	1.7959	180.41	14.91	0.000000
4	0.0019	0.1538	1.8860	178.15	14.91	0.000000
5	0.0020	0.1577	1.8074	180.05	14.91	0.000000
6	0.0020	0.1594	1.8457	180.94	14.91	0.000000
7	0.0023	0.1521	1.8852	178.71	14.91	0.000000
8	0.0025	0.1546	1.8246	182.76	14.91	0.000000
9	0.0025	0.1544	1.8048	181.38	14.91	0.000000
10	0.0021	0.1500	1.8209	182.09	14.91	0.000000

REFLEX ERROR FEED 132.00 -1.7717 150.50 0.0000

STEAM REBILIER STEAM TEMPERATURE DEFICIENT HEAT LOSS
112.91 502.73 518.50 101.44 1199.75

TIME = 45.00

PLATE	CLINX	CONCA EFFICI	LIQUID	VAPOUR	HEAT LOSS	EFFICIENCY
1	0.0017	0.1589	1.9741	181.93	14.91	0.000000
2	0.0018	0.1548	1.8758	180.17	14.91	0.000000
3	0.0018	0.1587	1.7959	180.41	14.91	0.000000
4	0.0019	0.1538	1.8860	178.15	14.91	0.000000
5	0.0020	0.1577	1.8074	180.05	14.91	0.000000
6	0.0020	0.1594	1.8457	180.94	14.91	0.000000
7	0.0023	0.1521	1.8852	178.71	14.91	0.000000
8	0.0025	0.1546	1.8246	182.76	14.91	0.000000
9	0.0025	0.1544	1.8048	181.38	14.91	0.000000
10	0.0021	0.1500	1.8209	182.09	14.91	0.000000

REFLEX ERROR FEED 132.00 -1.7717 150.50 0.0000

STEAM REBILIER STEAM TEMPERATURE DEFICIENT HEAT LOSS
112.91 502.73 518.50 101.44 1199.75

TABLE U-1 CPEN LOOP - STEP IN FEED FLCW - RUN 1

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0229	0.1375	0.9809	75.56	122.40	14.91	0.005461
2	C.0342	0.3598	0.8768	197.95	135.13	3.84	0.031256
3	0.2399	0.6018	0.7890	210.66	153.41	3.75	0.047521
4	C.4125	C.7600	0.8957	228.91	171.41	3.62	0.049930
5	0.5850	0.8412	C.9820	96.37	184.57	3.46	0.064628
6	C.7450	0.8936	0.8455	109.47	194.30	3.31	0.048467
7	C.8396	C.9292	0.7826	119.15	201.24	3.22	0.032569
8	C.9003	C.9569	0.8641	126.06	206.76	3.15	0.021383
9	C.9455	0.9758	0.8682	131.56	210.32	3.11	0.012592
10	C.9757	C.0000	C.0000	135.09	0.00	2.84	0.014412

REFLUX ERROR FEED FEED CONC.

135.09 -1.9268 150.50 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

115.91 202.54 218.51 7010.44 111969.16

TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0233	C.1406	C.9831	75.32	122.60	14.91	0.004491
2	C.0963	C.3650	0.8768	197.91	135.49	3.84	0.020846
3	C.2437	0.6062	C.7866	210.79	153.91	3.75	0.042345
4	C.4161	0.7621	0.8990	229.19	171.76	3.61	0.036764
5	C.5897	0.8430	C.9835	96.50	184.96	3.46	0.050342
6	C.7485	0.8950	0.8454	109.65	194.65	3.31	0.036966
7	C.8420	C.9302	C.7818	119.31	201.53	3.21	0.025055
8	C.9018	0.9576	C.8671	126.16	207.00	3.15	0.016412
9	0.9465	0.9763	C.8692	131.62	210.49	3.10	0.009440
10	C.9762	C.0000	C.0000	135.09	C.00	2.84	0.011005

REFLUX ERROR FEED FEED CONC.

135.09 -1.9749 150.50 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

115.91 202.47 218.45 7010.44 111974.09

TIME = 20.00

STEAM				TEMPERATURE				COEFFICIENT				HEAT LOAD			
REFLUX				FEED				FEED CONC.				REFLUX			
132.00				-1.2568				0.2060				132.00			
10.00				132.00				1.00				132.00			
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TABLE U-1 CPEN LCOP - STEP IN FEED FLCW - RUN 1

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0236	0.1431	C.9848	75.14	122.75	14.91	0.003574
2	C.0980	C.3692	0.8768	197.89	135.77	3.84	0.015100
3	C.2466	C.6097	C.7847	210.90	154.31	3.74	0.035330
4	C.4185	C.7637	C.9015	229.42	172.04	3.61	0.028109
5	0.5934	0.8444	C.9847	96.62	185.26	3.46	0.039472
6	C.7513	0.8960	C.8454	109.80	194.92	3.30	0.028693
7	C.8439	0.9309	C.7811	119.43	201.75	3.21	0.019345
8	C.9030	0.9581	C.8695	126.24	207.18	3.15	0.012490
9	C.9472	0.9766	C.8700	131.66	210.62	3.10	0.007722
10	0.9765	0.0000	C.0000	135.09	0.00	2.84	0.008057

REFLUX	ERROR	FEED	FEED CONC.
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135.09	-2.0117	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.42	218.40	7010.44	111977.90
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0239	0.1450	C.9861	74.99	122.87	14.91	0.002484
2	C.0993	C.3723	0.8768	197.86	135.98	3.84	0.015483
3	0.2489	0.6125	C.7833	210.96	154.64	3.74	0.021777
4	C.4211	0.7650	C.9035	229.60	172.26	3.61	0.024144
5	0.5963	0.8455	C.9856	96.70	185.50	3.45	0.029909
6	C.7534	0.8968	C.8453	109.92	195.14	3.30	0.022526
7	0.8453	0.9315	C.7806	119.53	201.93	3.21	0.015086
8	0.9039	0.9586	0.8713	126.31	207.33	3.15	0.009496
9	0.9478	0.9769	C.8706	131.69	210.73	3.10	0.005980
10	C.9768	C.0000	C.0000	135.09	0.00	2.84	0.006219

REFLUX	ERROR	FEED	FEED CONC.
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135.09	-2.0397	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.38	218.36	7010.44	111980.87
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TIME = 6.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	L - 39	DERIVATIVE
1	0.00336	0.1431	0.0000	0.1431	0.00336	0.00336
2	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
3	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
4	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
5	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
6	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
7	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
8	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
9	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
10	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
REFLX	ERROR	FEED	FEED CONC			
135.00	-2.0017	150.00	0.0000			
STEAM	TEMPERATURE					
FLW	REFLX	STEAM				
115.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 65.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	L - 39	DERIVATIVE
1	0.00336	0.1431	0.0000	0.1431	0.00336	0.00336
2	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
3	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
4	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
5	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
6	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
7	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
8	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
9	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
10	0.00336	0.0000	0.0000	0.0000	0.00336	0.00336
REFLX	ERROR	FEED	FEED CONC			
135.00	-2.0017	150.00	0.0000			
STEAM	TEMPERATURE					
FLW	REFLX	STEAM				
115.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-1 OPEN LOOP - STEP IN FEED FLOW - RUN 1

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0240	0.1465	C.9871	74.89	122.97	14.91	0.002176
2	C.1003	0.3749	C.8768	197.85	136.16	3.84	0.009262
3	C.2507	0.6145	C.7821	211.04	154.88	3.74	0.022506
4	C.4228	0.7660	C.9051	229.74	172.42	3.61	0.016164
5	C.5585	0.8463	C.9863	96.77	185.69	3.45	0.022798
6	0.7550	0.8975	C.8453	110.02	195.30	3.30	0.017329
7	C.8464	C.9320	C.7802	119.61	202.06	3.21	0.011708
8	0.9046	0.9589	C.8727	126.36	207.43	3.15	0.007643
9	C.9483	C.9771	C.8711	131.72	210.81	3.10	0.004350
10	0.9770	C.0000	C.0000	135.09	0.00	2.84	0.005014

REFLUX ERROR FEED FEED CONC.

135.09 -2.0614 150.50 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLOW REBCILER STEAM

115.91 202.35 218.33 7010.44 111983.16

TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0242	0.1478	C.9879	74.80	123.04	14.91	0.001583
2	C.1012	0.3769	C.8767	197.84	136.30	3.84	0.011298
3	C.2522	0.6161	C.7811	211.09	155.06	3.74	0.013907
4	C.4240	0.7666	C.9062	229.84	172.54	3.61	0.014105
5	C.6001	0.8469	C.9869	96.81	185.83	3.45	0.016580
6	C.7563	0.8980	C.8453	110.08	195.42	3.30	0.012847
7	C.8473	0.9324	C.7799	119.66	202.16	3.21	0.008819
8	0.9052	0.9591	C.8738	126.39	207.52	3.15	0.005649
9	C.9486	C.9772	C.8714	131.74	210.87	3.10	0.003595
10	C.9772	C.0000	C.0000	135.09	0.00	2.84	0.003683

REFLUX ERROR FEED FEED CONC.

135.09 -2.0783 150.50 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLOW REBCILER STEAM

115.91 202.33 218.30 7010.44 111985.04

20.25 = 3417

TIME = 52.0

TABLE U-1 OPEN LOOP - STEP IN FEED FLCW - RUN 1

TIME = 80.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0243	0.1488	C.9886	74.74	123.10	14.91	0.001365
2	C.1019	0.3786	0.8767	197.83	136.42	3.83	0.007321
3	0.2534	0.6173	C.7804	211.15	155.20	3.74	0.013014
4	0.4250	0.7672	C.9071	229.92	172.64	3.61	0.010366
5	C.6013	0.8474	C.9873	96.85	185.93	3.45	0.012947
6	0.7572	0.8983	C.8453	110.13	195.52	3.30	0.009853
7	C.8479	C.9326	C.7797	119.71	202.24	3.21	0.006695
8	0.9056	0.9593	0.8746	126.42	207.58	3.15	0.004336
9	0.9489	C.9773	0.8717	131.76	210.92	3.10	0.002981
10	0.9773	0.0000	C.0000	135.09	0.00	2.84	0.002320

REFLUX ERRORR FEED FEED CONC.

135.09 -2.0910 150.50 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

115.91 202.31 218.28 7010.44 111986.58

TIME = 85.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0244	0.1496	C.9891	74.68	123.15	14.91	0.001219
2	C.1024	0.3799	C.8767	197.83	136.52	3.83	0.003646
3	0.2544	0.6182	C.7798	211.19	155.31	3.74	0.012658
4	0.4257	0.7676	C.9078	229.98	172.71	3.61	0.007135
5	C.6023	0.8478	C.9876	96.88	186.02	3.45	0.010240
6	C.7579	0.8986	0.8453	110.17	195.59	3.30	0.007587
7	0.8484	0.9328	C.7795	119.74	202.30	3.21	0.005139
8	0.9059	0.9595	0.8752	126.45	207.63	3.15	0.003364
9	0.9491	0.9774	C.8719	131.77	210.96	3.10	0.001937
10	C.9774	0.0000	C.0000	135.09	0.00	2.84	0.002193

REFLUX ERRORR FEED FEED CONC.

135.09 -2.1008 150.50 0.5060

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

115.91 202.29 218.27 7010.44 111987.76

TABLE U-1 CPEN LOOP - STEP IN FEED FLCW - RUN 1

TIME = 90.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0245	0.1502	C.9895	74.64	123.19	14.91	0.000660
2	C.1028	0.3809	C.8767	197.83	136.58	3.83	0.007118
3	C.2551	0.6190	C.7793	211.22	155.40	3.74	0.004770
4	C.4263	0.7679	C.9083	230.03	172.77	3.61	0.007503
5	C.6030	0.8481	C.9878	96.90	186.08	3.45	0.007624
6	C.7585	0.8989	0.8452	110.20	195.65	3.30	0.005894
7	C.8488	C.9330	C.7794	119.77	202.35	3.21	0.003939
8	C.9061	C.9596	0.8757	126.46	207.67	3.15	0.002542
9	0.9492	0.9775	0.8721	131.78	210.99	3.10	0.001554
10	0.9775	0.0000	C.0000	135.09	0.00	2.84	0.001630

REFLUX	ERRCR	FEED	FEED CONC.
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135.09	-2.1083	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.28	218.25	7010.44	111988.72
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TIME = 95.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0246	0.1507	C.9898	74.61	123.22	14.91	0.000525
2	C.1032	0.3818	0.8767	197.83	136.64	3.83	0.005544
3	C.2557	C.6196	C.7789	211.25	155.47	3.74	0.003938
4	C.4268	C.7682	C.9088	230.07	172.82	3.60	0.005911
5	C.6036	0.8483	C.9880	96.92	186.13	3.45	0.006005
6	C.7589	0.8990	0.8452	110.23	195.70	3.30	0.004620
7	C.8491	0.9331	C.7793	119.79	202.39	3.21	0.003083
8	C.9063	C.9597	0.8761	126.48	207.70	3.15	0.002010
9	0.9493	0.9776	0.8722	131.79	211.01	3.10	0.001141
10	0.9775	0.0000	C.0000	135.09	0.00	2.83	0.001308

REFLUX	ERRCR	FEED	FEED CONC.
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135.09	-2.1139	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.27	218.24	7010.44	111989.46
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TIME = 20.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR EFFICI LIQUID VAPOR DERIVATIVE

1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

REFLEX ERROR FEED FEED

131.00 -2.1000 121.00 0.0000

STEAM REFLUX TEMPERATURE C EFFICIENT HEAT FLOW

112.01 202.25 21.20 10.00 112.01 112.01

TIME = 20.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR EFFICI LIQUID VAPOR DERIVATIVE

1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

REFLEX ERROR FEED FEED

132.00 -2.110 120.00 0.0000

STEAM REFLUX TEMPERATURE C EFFICIENT HEAT FLOW

112.01 202.25 21.20 10.00 112.01 112.01

TABLE U-1 OPEN LOOP - STEP IN FEED FLCW - RUN 1

TIME = 100.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0246	0.1511	0.9901	74.59	123.24	14.91	0.000683
2	0.1034	0.3825	0.8767	197.83	136.69	3.83	0.000473
3	0.2562	0.6200	0.7786	211.28	155.52	3.74	0.007866
4	0.4272	0.7684	0.9091	230.10	172.86	3.60	0.002913
5	0.6040	0.8485	0.9881	96.94	186.17	3.45	0.005071
6	0.7593	0.8992	0.8452	110.25	195.73	3.30	0.003633
7	0.8493	0.9332	0.7792	119.80	202.41	3.21	0.002440
8	0.9065	0.9598	0.8764	126.49	207.72	3.15	0.001569
9	0.9494	0.9776	0.8723	131.79	211.03	3.10	0.000959
10	0.9776	0.0000	0.0000	135.09	0.00	2.83	0.000979

REFLUX	ERROR	FEED	FEED CONC.
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135.09	-2.1184	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.26	218.24	7010.44	111990.04
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TIME = 105.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0247	0.1514	0.9903	74.57	123.26	14.91	0.000536
2	0.1036	0.3830	0.8767	197.83	136.73	3.83	0.000391
3	0.2566	0.6204	0.7784	211.30	155.56	3.74	0.006082
4	0.4275	0.7686	0.9094	230.13	172.89	3.60	0.002272
5	0.6044	0.8486	0.9882	96.95	186.20	3.45	0.003973
6	0.7595	0.8993	0.8452	110.26	195.76	3.30	0.002838
7	0.8495	0.9333	0.7791	119.82	202.44	3.21	0.001906
8	0.9066	0.9598	0.8766	126.49	207.74	3.15	0.001238
9	0.9495	0.9776	0.8724	131.80	211.04	3.10	0.000702
10	0.9776	0.0000	0.0000	135.09	0.00	2.83	0.000795

REFLUX	ERROR	FEED	FEED CONC.
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135.09	-2.1218	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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115.91	202.25	218.23	7010.44	111990.50
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TABLE 1 - 100% - 100% - 100% - 100%

TIME = 100.00

PLATE	CLCXX	CONC	EFFICI	LIQUID	VAPOR	HEAT	COEFFICIENT
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLEX ERROR FEED FEED CONC. 0.0000

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOSS 111.99.99

TIME = 100.00

PLATE	CLCXX	CONC	EFFICI	LIQUID	VAPOR	HEAT	COEFFICIENT
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLEX ERROR FEED FEED CONC. 0.0000

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOSS 111.99.99

TABLE U-2 OPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0491	0.2932	1.0407	60.30	101.78	14.86	0.000003
2	0.2024	0.5561	0.8181	162.08	115.83	4.35	0.000008
3	0.3825	0.7260	0.7119	176.13	129.55	4.20	0.000006
4	0.5110	0.8056	0.7754	189.85	137.73	4.08	0.000002
5	0.5753	0.8436	1.0855	198.03	142.84	4.01	0.000001
6	0.7471	0.8866	0.6729	81.13	148.75	3.82	0.000001
7	0.8271	0.9242	0.7950	87.05	154.34	3.73	0.000000
8	0.8933	0.9500	0.7142	92.64	158.15	3.65	-0.000001
9	0.9369	0.9705	0.7827	96.45	161.11	3.59	-0.000001
10	0.9705	0.0000	0.0000	99.41	0.00	3.32	-0.000000

REFLUX	ERROR	FEED	FEED CONC.
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99.41	-2.1218	122.00	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	198.58	210.18	7467.95	86591.36
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TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0378	0.2036	0.9563	38.48	97.39	14.88	-0.100321
2	0.1455	0.4715	0.8702	136.07	110.23	4.40	-0.616724
3	0.3301	0.6836	0.7228	149.32	125.22	4.25	-0.671207
4	0.4867	0.7933	0.7852	164.92	135.85	4.10	-0.392476
5	0.5742	0.8432	1.0836	175.93	142.40	4.01	-0.116152
6	0.7476	0.8868	0.6729	81.10	148.40	3.82	-0.022572
7	0.8276	0.9244	0.7950	87.12	153.98	3.72	0.000561
8	0.8935	0.9501	0.7142	92.70	157.76	3.65	0.003972
9	0.9370	0.9706	0.7827	96.47	160.70	3.59	0.002568
10	0.9705	0.0000	0.0000	99.41	0.00	3.32	0.001560

REFLUX	ERROR	FEED	FEED CONC.
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99.41	-0.0015	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	200.22	211.81	7467.95	86505.71
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TABLE 10-2 OPEN LOOP - STEP IN FEED FLOW

TIME = 1.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	DERIVATIVE
10	0.2105	0.0000	0.0000	0.0000	0.00000
9	0.2369	0.2105	0.0000	0.0000	-0.00000
8	0.2633	0.2500	0.0000	0.0000	-0.00000
7	0.2897	0.2945	0.0000	0.0000	0.00000
6	0.3161	0.3386	0.0000	0.0000	0.00000
5	0.3425	0.3827	0.0000	0.0000	0.00000
4	0.3689	0.4268	0.0000	0.0000	0.00000
3	0.3953	0.4709	0.0000	0.0000	0.00000
2	0.4217	0.5150	0.0000	0.0000	0.00000
1	0.4481	0.5591	0.0000	0.0000	0.00000
REFLX	0.4745	0.6032	0.0000	0.0000	0.00000
FEED	0.5150	0.6473	0.0000	0.0000	0.00000
TEMPERATURE	0.5591	0.6914	0.0000	0.0000	0.00000
COEFFICIENT	0.6032	0.7355	0.0000	0.0000	0.00000
HEAT LOAD	0.6473	0.7796	0.0000	0.0000	0.00000

TIME = 2.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	DERIVATIVE
10	0.2105	0.0000	0.0000	0.0000	0.00000
9	0.2369	0.2105	0.0000	0.0000	-0.00000
8	0.2633	0.2500	0.0000	0.0000	-0.00000
7	0.2897	0.2945	0.0000	0.0000	0.00000
6	0.3161	0.3386	0.0000	0.0000	0.00000
5	0.3425	0.3827	0.0000	0.0000	0.00000
4	0.3689	0.4268	0.0000	0.0000	0.00000
3	0.3953	0.4709	0.0000	0.0000	0.00000
2	0.4217	0.5150	0.0000	0.0000	0.00000
1	0.4481	0.5591	0.0000	0.0000	0.00000
REFLX	0.4745	0.6032	0.0000	0.0000	0.00000
FEED	0.5150	0.6473	0.0000	0.0000	0.00000
TEMPERATURE	0.5591	0.6914	0.0000	0.0000	0.00000
COEFFICIENT	0.6032	0.7355	0.0000	0.0000	0.00000
HEAT LOAD	0.6473	0.7796	0.0000	0.0000	0.00000

114E = IC.00

114 = 12.50

TABLE U-2 OPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0203	0.0821	0.8249	39.44	91.64	14.92	-0.047665
2	0.0581	0.2775	0.9503	131.18	99.71	4.45	-0.186082
3	0.1933	0.5126	0.7513	139.36	111.35	4.36	-0.416247
4	0.3608	0.7247	0.8361	151.32	127.63	4.22	-0.485957
5	0.5244	0.8189	0.9977	168.04	138.32	4.06	-0.249804
6	0.7192	0.8748	0.6839	77.50	145.85	3.85	-0.193212
7	0.8150	0.9189	0.7968	85.24	152.38	3.74	-0.096058
8	0.8885	0.9477	0.7151	91.88	156.64	3.65	-0.044052
9	0.9350	0.9697	0.7838	96.19	159.83	3.60	-0.021217
10	0.9700	0.0000	0.0000	99.41	0.00	3.32	-0.014178

REFLUX ERROR FEED FEED CONC.

99.41 0.0569 101.50 0.5151

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBOILER STEAM

89.15 202.95 214.51 7467.95 86363.63

TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0167	0.0638	0.7978	39.99	90.78	14.93	-0.039843
2	0.0449	0.2359	0.9625	130.85	97.67	4.46	-0.138679
3	0.1633	0.4598	0.7575	137.82	108.08	4.38	-0.326828
4	0.3217	0.6979	0.8519	148.47	124.80	4.26	-0.444109
5	0.5037	0.8071	0.9620	165.58	136.51	4.08	-0.235462
6	0.7017	0.8677	0.6908	76.05	144.53	3.87	-0.216106
7	0.8058	0.9151	0.7983	84.31	151.50	3.75	-0.119904
8	0.8841	0.9457	0.7160	91.42	156.02	3.66	-0.059645
9	0.9329	0.9687	0.7851	96.01	159.39	3.60	-0.029066
10	0.9692	0.0000	0.0000	99.41	0.00	3.32	-0.024753

REFLUX ERROR FEED FEED CONC.

99.41 0.1364 101.50 0.5151

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBOILER STEAM

89.15 203.63 215.19 7467.95 86328.24

10.3 = 3411

TIME = 52.25

TABLE U-2 OPEN LCOP - STEP IN FEED FLCW - RUN 2

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0137	0.0498	0.7755	40.73	90.10	14.93	-0.027533
2	0.0354	0.2002	0.9711	130.89	95.95	4.47	-0.080066
3	0.1389	0.4118	0.7626	136.78	105.33	4.40	-0.258796
4	0.2874	0.6718	0.8657	146.34	122.37	4.29	-0.393275
5	0.4844	0.7959	0.9287	163.71	134.83	4.10	-0.247766
6	0.6837	0.8607	0.6978	74.91	143.19	3.89	-0.223569
7	0.7956	0.9110	0.7998	83.51	150.51	3.76	-0.126911
8	0.8789	0.9432	0.7171	90.98	155.27	3.66	-0.066480
9	0.9301	0.9675	0.7866	95.82	158.82	3.60	-0.035309
10	0.9681	0.0000	0.0000	99.41	0.00	3.32	-0.028237

REFLUX	ERROR	FEED	FEED CONC.
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99.41	0.2452	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	204.19	215.75	7467.95	86298.78
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0118	0.0413	0.7610	41.17	89.70	14.93	-0.020251
2	0.0297	0.1724	0.9763	130.91	94.65	4.47	-0.058929
3	0.1195	0.3702	0.7666	135.90	103.10	4.41	-0.204561
4	0.2575	0.6440	0.8778	144.49	120.02	4.31	-0.314605
5	0.4642	0.7830	0.8939	161.67	133.12	4.12	-0.244044
6	0.6639	0.8527	0.7057	73.51	141.93	3.91	-0.254480
7	0.7843	0.9064	0.8016	82.60	149.65	3.78	-0.144545
8	0.8730	0.9405	0.7182	90.49	154.68	3.67	-0.075651
9	0.9270	0.9661	0.7884	95.61	158.44	3.61	-0.041375
10	0.9668	0.0000	0.0000	99.41	0.00	3.32	-0.031951

REFLUX	ERROR	FEED	FEED CONC.
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99.41	0.3762	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	204.56	216.11	7467.95	86279.63
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TABLE U-2 OPEN LOOP - 1 STEP IN FEED 11

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQV	VAPOR	HOLD-UP	DERIVATIVE
10	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM FLOW	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQV	VAPOR	HOLD-UP	DERIVATIVE
10	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM FLOW	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.9681	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-2 OPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 40.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0103	0.0351	0.7498	41.71	89.40	14.94	-0.015426
2	0.0255	0.1512	0.9802	131.15	93.69	4.47	-0.041898
3	0.1047	0.3360	0.7697	135.45	101.36	4.42	-0.145430
4	0.2335	0.6190	0.8875	143.23	117.92	4.33	-0.273938
5	0.4452	0.7702	0.8611	159.99	131.51	4.14	-0.217405
6	0.6424	0.8443	0.7141	72.30	140.63	3.93	-0.255903
7	0.7718	0.9013	0.8035	81.70	148.73	3.79	-0.151844
8	0.8663	0.9375	0.7196	89.98	154.04	3.68	-0.082542
9	0.9235	0.9645	0.7905	95.39	158.02	3.61	-0.043484
10	0.9653	0.0000	0.0000	99.41	0.00	3.32	-0.040496

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	0.5263	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	204.84	216.39	7467.95	86264.85
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TIME = 45.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0092	0.0307	0.7416	42.23	89.19	14.94	-0.011197
2	0.0225	0.1361	0.9829	131.45	92.99	4.47	-0.030110
3	0.0942	0.3080	0.7719	135.26	100.01	4.43	-0.107979
4	0.2137	0.5947	0.8955	142.35	115.90	4.35	-0.206073
5	0.4273	0.7576	0.8302	158.40	129.97	4.16	-0.202267
6	0.6208	0.8361	0.7227	71.17	139.41	3.96	-0.262003
7	0.7592	0.8963	0.8054	80.90	147.83	3.80	-0.152864
8	0.8593	0.9344	0.7209	89.49	153.40	3.69	-0.084348
9	0.9196	0.9628	0.7927	95.16	157.59	3.61	-0.049035
10	0.9636	0.0000	0.0000	99.41	0.00	3.32	-0.036842

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	0.6918	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.07	216.62	7467.95	86252.76
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TABLE U-2 OPEN LOOP - STEP IN FEED FLOW - RUN 2

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0084	C.0275	C.7355	42.87	89.04	14.94	-0.008517
2	C.0203	C.1249	C.9849	131.92	92.47	4.48	-0.023008
3	C.0863	C.2870	C.7735	135.37	98.99	4.43	-0.083351
4	0.1985	0.5754	C.9016	141.95	114.31	4.36	-0.162535
5	0.4121	C.7466	0.8040	157.39	128.62	4.17	-0.163356
6	0.6000	0.8284	C.7309	70.36	138.22	3.98	-0.235270
7	C.7467	0.8914	C.8073	80.22	146.91	3.82	-0.144536
8	0.8524	0.9312	C.7223	89.08	152.70	3.69	-0.080483
9	0.9157	0.9611	C.7949	94.96	157.10	3.62	-0.045664
10	0.9619	0.0000	C.0000	99.41	0.00	3.33	-0.041478

REFLUX	ERROR	FEED	FEED CONC.
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99.41	0.8626	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.25	216.80	7467.95	86243.43
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TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0078	C.0251	0.7308	43.55	88.92	14.94	-0.006556
2	C.0187	0.1164	C.9864	132.49	92.08	4.48	-0.017561
3	C.0802	0.2709	C.7748	135.66	98.21	4.44	-0.063522
4	C.1867	0.5604	C.9064	141.83	113.09	4.37	-0.121653
5	0.4001	C.7379	C.7834	156.80	127.60	4.19	-0.129746
6	C.5827	0.8210	C.7377	69.93	137.06	4.00	-0.186205
7	C.7348	0.8868	0.8092	79.59	146.02	3.83	-0.138585
8	C.8459	0.9283	C.7236	88.70	152.00	3.70	-0.076803
9	0.9120	C.9595	C.7971	94.78	156.58	3.62	-0.043411
10	C.9602	C.0000	C.0000	99.41	0.00	3.33	-0.039490

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.0279	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.39	216.93	7467.95	86236.29
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TABLE U-2 OPEN LOOP - IN-LEAD TIME - 2

TIME = 2.0

PLATE	CONCX	CONV	EFFICI	LIQUID	VAPOR	HEAT - DEVI
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED
22.41 101.20 0.2121

STEAM TEMPERATURE
FLW REFLUX
22.41 101.20 0.2121

TIME = 2.0

PLATE	CONCX	CONV	EFFICI	LIQUID	VAPOR	HEAT - DEVI
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED
22.41 101.20 0.2121

STEAM TEMPERATURE
FLW REFLUX
22.41 101.20 0.2121

TABLE U-2 CPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0073	C.0234	C.7274	44.16	88.84	14.94	-0.004703
2	C.0175	0.1103	C.9875	133.01	91.80	4.48	-0.011448
3	C.0759	0.2592	C.7757	135.97	97.65	4.44	-0.043875
4	C.1785	0.5475	0.9097	141.85	112.21	4.37	-0.082093
5	C.3905	0.7302	C.7667	156.47	126.68	4.19	-0.097712
6	C.5682	0.8147	C.7434	69.53	136.10	4.01	-0.171537
7	C.7240	0.8827	C.8108	79.13	145.23	3.84	-0.121817
8	C.8398	0.9256	C.7248	88.40	151.37	3.71	-0.069216
9	C.9086	0.9580	C.7991	94.62	156.11	3.63	-0.039722
10	0.9587	0.0000	C.0000	99.41	0.00	3.33	-0.037011

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	1.1840	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.49	217.04	7467.95	86231.01
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0070	C.0221	C.7249	44.65	88.78	14.94	-0.003286
2	C.0167	0.1060	C.9883	133.43	91.60	4.48	-0.007953
3	C.0729	0.2511	C.7763	136.26	97.26	4.44	-0.031243
4	C.1727	0.5384	C.9121	141.94	111.59	4.38	-0.059741
5	C.3833	0.7238	C.7543	156.31	125.96	4.20	-0.075862
6	C.5549	0.8093	C.7487	69.25	135.31	4.03	-0.143706
7	C.7146	0.8791	C.8123	78.76	144.58	3.85	-0.104660
8	0.8344	0.9232	C.7259	88.14	150.85	3.72	-0.060884
9	C.9054	0.9566	C.8009	94.48	155.73	3.63	-0.035477
10	0.9572	0.0000	C.0000	99.41	0.00	3.33	-0.033481

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	1.3278	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.56	217.11	7467.95	86227.25
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TABLE U-2 : OPEN LOOP - STEP IN FEED FLOW - RUN 2

TIME = 60.00

PLATE	CONC X	EFFICI	LIQUID	VAPOR	LD-25 DERIVATIVE
1	0.0073	0.0034	0.0034	0.0034	0.004703
2	0.0175	0.0111	0.0111	0.0111	0.0114
3	0.0159	0.0157	0.0157	0.0157	0.0157
4	0.0182	0.0247	0.0247	0.0247	0.0247
5	0.0202	0.0368	0.0368	0.0368	0.0368
6	0.0265	0.0447	0.0447	0.0447	0.0447
7	0.0340	0.0887	0.0887	0.0887	0.0887
8	0.0398	0.0928	0.0928	0.0928	0.0928
9	0.0486	0.0920	0.0920	0.0920	0.0920
10	0.0587	0.0000	0.0000	0.0000	0.003701
REFLUX	1.1840	101.50	0.2151		
STEAM FLOW					
TEMPERATURE					
COEFFICIENT					
HEAT LOAD					
REFLUX	1.1840	101.50	0.2151		
STEAM FLOW					
TEMPERATURE					
COEFFICIENT					
HEAT LOAD					

TIME = 65.00

PLATE	CONC X	EFFICI	LIQUID	VAPOR	LD-25 DERIVATIVE
1	0.0070	0.0031	0.0031	0.0031	0.00328
2	0.0167	0.0160	0.0160	0.0160	0.0160
3	0.0159	0.0211	0.0211	0.0211	0.0211
4	0.0187	0.0384	0.0384	0.0384	0.0384
5	0.0233	0.0388	0.0388	0.0388	0.0388
6	0.0299	0.0808	0.0808	0.0808	0.0808
7	0.0316	0.0870	0.0870	0.0870	0.0870
8	0.0388	0.0888	0.0888	0.0888	0.0888
9	0.0484	0.0900	0.0900	0.0900	0.0900
10	0.0575	0.0000	0.0000	0.0000	0.003701
REFLUX	1.3278	101.50	0.2151		
STEAM FLOW					
TEMPERATURE					
COEFFICIENT					
HEAT LOAD					
REFLUX	1.3278	101.50	0.2151		
STEAM FLOW					
TEMPERATURE					
COEFFICIENT					
HEAT LOAD					

TABLE U-2 OPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0068	0.0213	0.7232	45.13	88.74	14.94	-0.002315
2	0.0161	0.1029	0.9888	133.87	91.47	4.48	-0.005530
3	0.0707	0.2453	0.7768	136.60	96.99	4.44	-0.022641
4	0.1684	0.5317	0.9138	142.14	111.14	4.38	-0.043612
5	0.3778	0.7190	0.7449	156.32	125.44	4.21	-0.057334
6	0.5443	0.8051	0.7528	69.18	134.66	4.04	-0.111153
7	0.7067	0.8761	0.8135	78.51	144.00	3.86	-0.084360
8	0.8297	0.9212	0.7268	87.95	150.37	3.72	-0.051539
9	0.9027	0.9554	0.8025	94.38	155.36	3.63	-0.028638
10	0.9560	0.0000	0.0000	99.41	0.00	3.33	-0.028831

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.4544	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.61	217.16	7467.95	86224.62
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0066	0.0207	0.7219	45.49	88.71	14.94	-0.001704
2	0.0157	0.1007	0.9892	134.20	91.37	4.48	-0.004517
3	0.0691	0.2410	0.7771	136.86	96.79	4.45	-0.016589
4	0.1652	0.5267	0.9151	142.29	110.81	4.38	-0.033779
5	0.3736	0.7155	0.7376	156.34	125.07	4.21	-0.044144
6	0.5361	0.8018	0.7561	69.14	134.19	4.05	-0.086266
7	0.7004	0.8737	0.8144	78.35	143.58	3.87	-0.067337
8	0.8258	0.9196	0.7276	87.81	150.02	3.73	-0.041408
9	0.9004	0.9545	0.8038	94.31	155.10	3.64	-0.023966
10	0.9549	0.0000	0.0000	99.41	0.00	3.33	-0.023466

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.5601	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.65	217.19	7467.95	86222.73
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TABLE U-2 CPEN LCOP - STEP IN FEED FLCW - RUN 2

TIME = 80.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0065	0.0202	C.7210	45.78	88.69	14.95	-0.001155
2	C.0154	0.0990	C.9894	134.47	91.29	4.48	-0.003298
3	C.0679	0.2377	C.7774	137.08	96.63	4.45	-0.012670
4	0.1627	0.5229	C.9161	142.43	110.55	4.38	-0.026336
5	C.3703	C.7128	C.7320	156.37	124.79	4.21	-0.034162
6	C.5298	C.7993	C.7586	69.13	133.82	4.06	-0.066798
7	C.6954	0.8718	0.8152	78.24	143.23	3.88	-0.052626
8	0.8227	0.9183	C.7282	87.71	149.74	3.73	-0.033064
9	C.8986	C.9537	C.8048	94.25	154.87	3.64	-0.018669
10	C.9541	0.0000	C.0000	99.41	0.00	3.33	-0.019232

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	1.6459	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.67	217.22	7467.95	86221.35
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TIME = 85.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0064	0.0199	C.7204	46.01	88.67	14.95	-0.000896
2	C.0152	0.0977	C.9896	134.69	91.23	4.48	-0.002211
3	C.0669	0.2352	C.7776	137.25	96.52	4.45	-0.010149
4	C.1608	0.5200	C.9169	142.54	110.36	4.38	-0.020059
5	C.3678	C.7107	C.7276	156.39	124.57	4.22	-0.026676
6	0.5249	0.7973	C.7605	69.13	133.55	4.06	-0.051911
7	0.6915	0.8704	C.8158	78.16	142.97	3.88	-0.041124
8	C.8203	0.9173	C.7287	87.63	149.52	3.73	-0.025808
9	0.8972	0.9531	C.8056	94.21	154.71	3.64	-0.016175
10	C.9534	0.0000	C.0000	99.41	0.00	3.33	-0.013437

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	1.7146	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.69	217.24	7467.95	86220.35
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TABLE U-2 OPEN LOOP - STEP IN FEED FLOW - RUN 2

TIME = 90.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0063	C.0197	C.7199	46.19	88.66	14.95	-0.000661
2	C.0150	C.0967	C.9898	134.85	91.19	4.48	-0.002006
3	0.0662	0.2332	C.7777	137.38	96.43	4.45	-0.007510
4	0.1593	0.5177	C.9175	142.62	110.20	4.39	-0.015953
5	C.3658	0.7091	C.7242	156.41	124.40	4.22	-0.020902
6	0.5211	0.7958	C.7620	69.13	133.33	4.06	-0.039739
7	C.6885	0.8692	0.8163	78.10	142.77	3.88	-0.031807
8	0.8184	0.9165	C.7291	87.57	149.35	3.74	-0.020252
9	0.8960	0.9526	0.8063	94.18	154.57	3.64	-0.011512
10	0.9528	C.0000	C.0000	99.41	0.00	3.34	-0.012096

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	1.7691	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.71	217.25	7467.95	86219.60
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TIME = 95.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0063	C.0195	C.7195	46.33	88.65	14.95	-0.000549
2	C.0149	0.0959	C.9899	134.99	91.15	4.48	-0.001335
3	C.0656	0.2317	C.7779	137.48	96.36	4.45	-0.006233
4	0.1582	0.5159	C.9179	142.69	110.09	4.39	-0.012274
5	0.3643	0.7079	C.7216	156.43	124.28	4.22	-0.016374
6	0.5182	0.7946	C.7632	69.14	133.17	4.07	-0.030692
7	C.6862	0.8684	C.8166	78.06	142.61	3.89	-0.024544
8	C.8169	0.9159	C.7294	87.53	149.21	3.74	-0.015562
9	0.8952	0.9522	0.8068	94.15	154.46	3.64	-0.009835
10	0.9524	C.0000	C.0000	99.41	0.00	3.34	-0.008257

REFLUX	ERRCR	FEED	FEED CONC.
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99.41	1.8117	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.72	217.26	7467.95	86219.03
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TABLE D-2: OPEN FLOW - STEP 1 - 4-TH FLOW - 5

TIME = 0.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	DEL - UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 0.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	DEL - UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-2 OPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 100.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0062	0.0193	0.7192	46.44	88.65	14.95	-0.000401
2	0.0148	0.0953	0.9900	135.09	91.13	4.48	-0.001338
3	0.0651	0.2304	0.7779	137.56	96.30	4.45	-0.004503
4	0.1573	0.5145	0.9183	142.74	109.99	4.39	-0.009889
5	0.3631	0.7069	0.7195	156.44	124.18	4.22	-0.012678
6	0.5159	0.7937	0.7640	69.14	133.04	4.07	-0.023833
7	0.6844	0.8677	0.8169	78.03	142.49	3.89	-0.018999
8	0.8158	0.9154	0.7296	87.50	149.11	3.74	-0.012126
9	0.8945	0.9519	0.8072	94.13	154.38	3.64	-0.006921
10	0.9521	0.0000	0.0000	99.41	0.00	3.34	-0.007310

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.8448	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.73	217.27	7467.95	86218.54
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TIME = 105.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0062	0.0192	0.7190	46.52	88.64	14.95	-0.000343
2	0.0147	0.0948	0.9901	135.16	91.10	4.48	-0.000808
3	0.0648	0.2295	0.7780	137.63	96.26	4.45	-0.003865
4	0.1566	0.5134	0.9186	142.78	109.92	4.39	-0.007522
5	0.3622	0.7062	0.7179	156.45	124.10	4.22	-0.009994
6	0.5142	0.7931	0.7647	69.14	132.94	4.07	-0.018550
7	0.6830	0.8672	0.8171	78.00	142.40	3.89	-0.014773
8	0.8149	0.9150	0.7298	87.47	149.03	3.74	-0.009347
9	0.8939	0.9517	0.8075	94.12	154.32	3.65	-0.005904
10	0.9518	0.0000	0.0000	99.41	0.00	3.34	-0.004960

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.8705	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.73	217.28	7467.95	86218.20
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TABLE U-2 OPEN LOOP - STEP IN FEED FLCW - RUN 2

TIME = 110.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0062	C.0191	C.7188	46.59	88.64	14.95	-0.000262
2	C.0147	0.0944	C.9901	135.22	91.09	4.48	-0.000711
3	C.0645	0.2288	C.7781	137.67	96.22	4.45	-0.002940
4	C.1560	0.5125	C.9188	142.81	109.86	4.39	-0.005959
5	C.3614	0.7056	C.7166	156.46	124.04	4.22	-0.007754
6	0.5128	0.7925	C.7653	69.14	132.86	4.07	-0.014212
7	C.6819	0.8668	C.8173	77.98	142.32	3.89	-0.011843
8	C.8142	0.9147	C.7299	87.45	148.97	3.74	-0.007330
9	C.8935	0.9515	C.8077	94.11	154.27	3.65	-0.004594
10	0.9516	0.0000	C.0000	99.41	0.00	3.34	-0.003847

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.8904	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.74	217.28	7467.95	86217.90
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TIME = 115.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0062	C.0191	C.7186	46.64	88.63	14.95	-0.000213
2	C.0146	0.0941	C.9902	135.27	91.07	4.48	-0.000479
3	C.0643	0.2282	C.7781	137.71	96.20	4.45	-0.002367
4	C.1556	0.5118	0.9190	142.84	109.82	4.39	-0.004537
5	C.3608	0.7052	0.7156	156.46	124.00	4.22	-0.005999
6	0.5118	0.7920	C.7657	69.14	132.80	4.07	-0.011009
7	C.6810	0.8664	C.8174	77.96	142.27	3.89	-0.009418
8	C.8137	0.9145	C.7300	87.44	148.92	3.74	-0.005863
9	C.8932	0.9514	C.8079	94.10	154.23	3.65	-0.003653
10	0.9515	0.0000	C.0000	99.41	0.00	3.34	-0.003034

REFLUX	ERROR	FEED	FEED CONC.
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99.41	1.9060	101.50	0.5151
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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89.15	205.74	217.29	7467.95	86217.67
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00.011 = 3011

TIME = 112.00

TABLE U-3 CPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0052	0.1144	1.2189	70.73	118.50	14.95	0.000002
2	0.0736	0.2457	0.7350	189.23	125.47	3.85	0.000004
3	0.1590	0.4745	0.7994	196.20	139.63	3.80	0.000009
4	0.3167	0.7136	0.9773	210.36	162.14	3.69	0.000011
5	0.4714	0.7891	0.9041	82.57	171.96	3.57	0.000004
6	0.6377	0.8532	0.8510	92.40	182.66	3.41	0.000002
7	0.7670	0.9070	0.9699	103.09	193.00	3.29	0.000001
8	0.8663	0.9275	0.4278	113.43	196.63	3.19	-0.000001
9	0.9020	0.9650	1.2240	117.06	204.72	3.15	-0.000000
10	0.9650	0.0000	0.0000	125.15	0.00	2.85	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.9060	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	205.95	230.08	4532.19	109331.00
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TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0078	0.1376	1.2080	80.84	119.90	14.94	0.025849
2	0.0872	0.2907	0.7508	200.69	128.28	3.84	0.157367
3	0.1862	0.5241	0.7951	208.99	143.52	3.78	0.333429
4	0.3484	0.7358	0.9833	224.01	164.97	3.67	0.394825
5	0.5104	0.8064	0.9059	94.86	175.06	3.53	0.494315
6	0.6671	0.8653	0.8637	104.49	185.26	3.39	0.390406
7	0.7866	0.9138	0.9555	114.32	194.77	3.27	0.251609
8	0.8758	0.9346	0.4830	123.58	198.55	3.18	0.124327
9	0.9124	0.9671	1.1358	127.23	205.52	3.14	0.127865
10	0.9664	0.0000	0.0000	134.06	0.00	2.85	0.050561

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-0.1407	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	205.38	229.52	4532.19	109390.18
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TABLE D-3: OPEN FL - STEP IN REFLUX FLOW - RUN 1

TIME = 0.00									
PLATE	CONC	EFFICI	LIQUID	VAPOR	FL - UP	DERIVATIVE	REFLUX	ERROR	FEED
1	0.0000	0.1144	1.2189	70.73	111.77	14.75	152.16	1.2000	150.30
2	0.0000	0.1136	1.1827	189.23	147.47	1.85	0.2133		
3	0.0000	0.1120	0.9594	19.77	110.77	1.80			
4	0.0000	0.1117	0.7134	110.36	144.44	1.69			
5	0.0000	0.1114	0.4891	85.27	171.77	1.57			
6	0.0000	0.1117	0.2710	77.40	177.47	1.41			
7	0.0000	0.1110	0.0999	103.09	193.00	1.29			
8	0.0000	0.1116	0.4278	113.43	196.63	1.19			
9	0.0000	0.1110	1.2240	117.06	204.77	1.12			
10	0.0000	0.1110	0.0000	152.12	0.00	1.82			
TIME = 2.00									
PLATE	CONC	EFFICI	LIQUID	VAPOR	FL - UP	DERIVATIVE	REFLUX	ERROR	FEED
1	0.0000	0.1137	1.2080	70.73	110.90	14.74	154.06	-0.1407	150.3
2	0.0000	0.1130	0.9508	189.23	147.47	1.84	0.2133		
3	0.0000	0.1124	0.7071	19.77	110.77	1.79			
4	0.0000	0.1120	0.4833	85.27	171.77	1.67			
5	0.0000	0.1120	0.2709	77.40	177.47	1.54			
6	0.0000	0.1121	0.0987	103.09	193.00	1.42			
7	0.0000	0.1121	0.4252	113.43	196.63	1.32			
8	0.0000	0.1120	0.4833	117.06	196.63	1.18			
9	0.0000	0.1124	1.1320	117.06	196.63	1.14			
10	0.0000	0.0000	0.0000	152.12	0.00	1.50			

154.06 -0.1407 150.3 0.2133

STEAM REFLUX TEMPERATURE

COEFFICIENT

FEED CONC.

TABLE U=3 OPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0097	0.1561	1.2000	79.82	121.03	14.94	0.021006
2	0.0995	0.3303	0.7651	200.81	130.79	3.84	0.139237
3	0.2129	0.5663	0.7908	210.49	147.24	3.77	0.316016
4	0.3799	0.7527	0.9893	226.74	167.35	3.64	0.332574
5	0.5473	0.8225	0.9077	96.28	178.04	3.50	0.392613
6	0.6973	0.8773	0.8768	106.60	187.87	3.36	0.339913
7	0.8065	0.9209	0.9411	116.11	196.53	3.25	0.223838
8	0.8860	0.9418	0.5418	124.53	200.45	3.17	0.117343
9	0.9226	0.9694	1.0496	128.33	206.30	3.13	0.115355
10	0.9686	0.0000	0.0000	134.06	0.00	2.84	0.055737

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-0.3685	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	204.96	229.10	4532.19	109433.77
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TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0115	0.1732	1.1926	78.97	122.04	14.94	0.022705
2	0.1114	0.3649	0.7788	200.97	133.02	3.83	0.143566
3	0.2376	0.5993	0.7869	211.86	150.42	3.75	0.273905
4	0.4057	0.7661	0.9941	229.08	169.38	3.62	0.291350
5	0.5779	0.8346	0.9091	97.49	180.29	3.47	0.339596
6	0.7221	0.8870	0.8875	108.09	189.93	3.33	0.254714
7	0.8233	0.9272	0.9288	117.48	198.01	3.23	0.176651
8	0.8954	0.9481	0.5964	125.37	201.99	3.16	0.105226
9	0.9316	0.9717	0.9738	129.24	206.92	3.12	0.098350
10	0.9709	0.0000	0.0000	134.06	0.00	2.84	0.053868

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-0.5986	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	204.61	228.76	4532.19	109469.81
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TABLE U-3 OPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0134	0.1891	1.1849	77.98	123.00	14.93	0.021872
2	0.1226	0.3951	0.7917	200.94	135.04	3.82	0.128838
3	0.2593	0.6260	0.7835	212.90	153.43	3.74	0.253351
4	0.4275	0.7767	0.9982	231.11	171.17	3.60	0.230142
5	0.6029	0.8438	0.9103	98.36	182.19	3.45	0.263922
6	0.7408	0.8943	0.8956	109.11	191.68	3.31	0.195759
7	0.8363	0.9321	0.9193	118.41	199.36	3.22	0.137895
8	0.9032	0.9530	0.6417	125.95	203.41	3.15	0.083478
9	0.9388	0.9737	0.9128	129.91	207.64	3.11	0.075477
10	0.9730	0.0000	0.0000	134.06	0.00	2.84	0.046275

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-0.8078	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	204.26	228.42	4532.19	109505.72
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0151	0.2028	1.1777	77.11	123.85	14.93	0.019651
2	0.1323	0.4219	0.8030	200.91	136.91	3.82	0.105099
3	0.2787	0.6477	0.7804	213.92	155.95	3.72	0.211789
4	0.4450	0.7852	1.0015	232.81	172.69	3.59	0.191526
5	0.6223	0.8511	0.9113	99.09	183.76	3.43	0.206318
6	0.7553	0.9001	0.9019	109.96	193.13	3.30	0.154704
7	0.8465	0.9361	0.9119	119.17	200.48	3.21	0.108576
8	0.9094	0.9568	0.6777	126.41	204.55	3.14	0.065898
9	0.9443	0.9753	0.8664	130.41	208.27	3.11	0.055696
10	0.9748	0.0000	0.0000	134.06	0.00	2.84	0.042376

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-0.9854	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	203.93	228.10	4532.19	109539.79
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TABLE D-3. OPEN LOOP - STEP IN REFLEX TIME - RUN 1

TIME = 20.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT -	DERIVATIVE
1	0.013	0.1891	0.1849	0.1849	0.013	0.013
2	0.1556	0.3921	0.3911	0.3911	0.1556	0.1556
3	0.2293	0.5785	0.5785	0.5785	0.2293	0.2293
4	0.4475	0.7767	0.7767	0.7767	0.4475	0.4475
5	0.7767	0.9103	0.9103	0.9103	0.7767	0.7767
6	0.9103	0.9848	0.9848	0.9848	0.9103	0.9103
7	0.9848	0.9981	0.9981	0.9981	0.9848	0.9848
8	0.9981	0.9999	0.9999	0.9999	0.9981	0.9981
9	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
10	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
REFLEX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ERROR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 25.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT -	DERIVATIVE
1	0.013	0.1891	0.1849	0.1849	0.013	0.013
2	0.1556	0.3921	0.3911	0.3911	0.1556	0.1556
3	0.2293	0.5785	0.5785	0.5785	0.2293	0.2293
4	0.4475	0.7767	0.7767	0.7767	0.4475	0.4475
5	0.7767	0.9103	0.9103	0.9103	0.7767	0.7767
6	0.9103	0.9848	0.9848	0.9848	0.9103	0.9103
7	0.9848	0.9981	0.9981	0.9981	0.9848	0.9848
8	0.9981	0.9999	0.9999	0.9999	0.9981	0.9981
9	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
10	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
REFLEX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ERROR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-3 CPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0166	0.2142	1.1713	76.33	124.55	14.93	0.018149
2	C.1405	0.4435	0.8125	200.84	138.46	3.81	0.095859
3	0.2948	0.6638	C.7779	214.69	157.81	3.71	0.177708
4	0.4586	0.7918	1.0041	233.92	173.94	3.58	0.133201
5	C.6374	0.8569	C.9120	99.63	185.08	3.41	0.155231
6	C.7667	C.9047	C.9069	110.62	194.33	3.29	0.119439
7	0.8545	0.9392	C.9060	119.76	201.43	3.20	0.084586
8	0.9143	0.9596	C.7060	126.77	205.49	3.14	0.051942
9	0.9485	0.9766	0.8309	130.77	208.83	3.10	0.042963
10	0.9762	C.0000	C.0000	134.06	0.00	2.84	0.031492

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-1.1284	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	203.64	227.82	4532.19	109569.66
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0185	0.2219	1.1633	75.70	125.05	14.92	0.025940
2	C.1472	0.4590	0.8203	200.71	139.63	3.81	0.064549
3	C.3072	C.6751	C.7759	215.24	159.10	3.70	0.127920
4	0.4684	C.7961	1.0059	234.62	174.77	3.57	0.097212
5	0.6483	0.8610	C.9125	99.90	186.03	3.40	0.107308
6	C.7752	0.9081	0.9106	111.05	195.24	3.28	0.085505
7	C.8606	C.9416	C.9015	120.18	202.16	3.19	0.062142
8	C.9181	C.9618	C.7279	127.04	206.20	3.13	0.039010
9	0.9516	0.9776	0.8042	131.03	209.26	3.10	0.032492
10	C.9774	C.0000	C.0000	134.06	0.00	2.84	0.023812

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-1.2398	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	203.28	227.46	4532.19	109607.37
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TIME = 35.00

PLATE	CONC	CONV	EFFICI	LIQUID	VAPOR	REFL - UP	DERIVATIVE
1	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
2	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
3	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
4	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
5	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
6	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
7	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
8	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
9	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
10	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
REFLX	ERROR	FEED	FEED CONC.				
134.06	-1.1587	1.1713	0.2133				
STEAM	TEMPERATURE	EFFICIENT	HEAT LOAD				
114.16	203.64	1.1713	1.1713				

TIME = 35.00

PLATE	CONC	CONV	EFFICI	LIQUID	VAPOR	REFL - UP	DERIVATIVE
1	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
2	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
3	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
4	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
5	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
6	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
7	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
8	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
9	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
10	0.0166	0.0166	1.1713	184.23	184.23	14.23	0.018149
REFLX	ERROR	FEED	FEED CONC.				
134.06	-1.2328	1.1713	0.2133				
STEAM	TEMPERATURE	EFFICIENT	HEAT LOAD				
114.16	203.64	1.1713	1.1713				

TABLE U-3 OPEN LCOP - STEP IN REFLUX FLOW - RUN 1

TIME = 40.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0206	0.2281	1.1548	75.19	125.47	14.92	0.022358
2	C.1521	C.4703	0.8259	200.62	140.52	3.81	0.054905
3	C.3161	0.6834	C.7745	215.63	160.10	3.69	0.087008
4	C.4754	0.7991	1.0073	235.14	175.41	3.56	0.074648
5	C.6559	0.8638	C.9129	100.09	186.72	3.40	0.077097
6	C.7812	0.9104	C.9132	111.32	195.91	3.27	0.060009
7	0.8650	0.9433	0.8983	120.45	202.72	3.19	0.043961
8	C.9209	C.9634	C.7441	127.22	206.75	3.13	0.028190
9	C.9539	C.9784	C.7847	131.22	209.62	3.10	0.022793
10	C.9782	C.0000	C.0000	134.06	0.00	2.83	0.018080

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-1.3236	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	202.91	227.10	4532.19	109645.57
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TIME = 45.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0223	0.2330	1.1478	74.80	125.79	14.91	0.018251
2	C.1558	C.4791	C.8302	200.56	141.23	3.80	0.042652
3	C.3230	0.6891	C.7734	215.97	160.79	3.69	0.072156
4	C.4805	0.8013	1.0082	235.47	175.88	3.56	0.048276
5	C.6613	0.8658	C.9131	100.22	187.23	3.39	0.053681
6	C.7855	0.9121	C.9150	111.51	196.40	3.27	0.042407
7	C.8681	0.9445	0.8961	120.64	203.13	3.19	0.031302
8	0.9229	0.9645	C.7556	127.34	207.15	3.13	0.019653
9	0.9556	0.9790	C.7709	131.34	209.89	3.09	0.016234
10	0.9788	C.0000	C.0000	134.06	0.00	2.83	0.013105

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-1.3848	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	202.63	226.83	4532.19	109673.48
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TABLE U-3. OPEN LOOP - STEP 1A REFLEX FLOW - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLEX ERROR FEED CONC.

134.00 -1.3230 150.30 0.2133

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

114.16 202.21 227.10 4335.19 1.9045.04

TIME = 45.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLEX ERROR FEED CONC.

134.00 -1.3843 15.00 0.2133

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

114.16 202.21 227.10 4335.19 1.9045.04

TABLE U-3 OPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0237	0.2368	1.1420	74.52	126.05	14.91	0.015036
2	C.1588	0.4862	0.8337	200.54	141.81	3.80	0.028117
3	C.3285	0.6930	0.7725	216.28	161.28	3.68	0.059878
4	C.4839	0.8028	1.0089	235.71	176.20	3.56	0.034218
5	C.6651	0.8671	0.9133	100.30	187.58	3.39	0.037755
6	C.7884	0.9133	0.9163	111.64	196.74	3.27	0.029319
7	C.8703	0.9453	0.8945	120.77	203.42	3.18	0.021654
8	C.9243	0.9652	0.7637	127.43	207.44	3.13	0.014239
9	0.9567	0.9794	0.7612	131.43	210.09	3.09	0.010654
10	0.9792	0.0000	0.0000	134.06	0.00	2.83	0.009554

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-1.4287	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	202.41	226.62	4532.19	109696.38
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TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0248	0.2398	1.1374	74.32	126.25	14.91	0.011732
2	0.1610	0.4915	0.8363	200.54	142.24	3.80	0.023689
3	0.3326	0.6960	0.7719	216.52	161.65	3.68	0.042689
4	C.4865	0.8039	1.0093	235.90	176.44	3.55	0.026558
5	C.6678	0.8681	0.9134	100.36	187.83	3.39	0.027425
6	0.7905	0.9141	0.9172	111.73	196.99	3.27	0.020972
7	0.8719	0.9459	0.8934	120.86	203.62	3.18	0.015293
8	0.9253	0.9658	0.7694	127.49	207.64	3.13	0.009782
9	0.9575	0.9796	0.7546	131.49	210.22	3.09	0.008560
10	0.9796	0.0000	0.0000	134.06	0.00	2.83	0.005276

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-1.4595	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	202.24	226.44	4532.19	109714.69
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TABLE U-3 OPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0256	0.2420	1.1338	74.17	126.40	14.91	0.009137
2	0.1627	0.4956	0.8383	200.56	142.57	3.80	0.017453
3	0.3358	0.6982	0.7714	216.72	161.93	3.68	0.033123
4	0.4884	0.8047	1.0097	236.05	176.62	3.55	0.019911
5	0.6697	0.8688	0.9135	100.42	188.02	3.38	0.020150
6	0.7920	0.9147	0.9178	111.80	197.17	3.26	0.015196
7	0.8729	0.9464	0.8926	120.93	203.77	3.18	0.010961
8	0.9260	0.9662	0.7734	127.53	207.78	3.13	0.006954
9	0.9581	0.9798	0.7499	131.53	210.32	3.09	0.006031
10	0.9798	0.0000	0.0000	134.06	0.00	2.83	0.003721

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-1.4812	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	202.10	226.31	4532.19	109728.95
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0263	0.2437	1.1310	74.06	126.52	14.91	0.007008
2	0.1640	0.4987	0.8397	200.57	142.83	3.80	0.013746
3	0.3381	0.6999	0.7710	216.87	162.15	3.68	0.024377
4	0.4898	0.8053	1.0100	236.18	176.76	3.55	0.015236
5	0.6712	0.8694	0.9136	100.47	188.16	3.38	0.014908
6	0.7931	0.9151	0.9183	111.86	197.30	3.26	0.011119
7	0.8737	0.9467	0.8920	120.98	203.89	3.18	0.007932
8	0.9265	0.9664	0.7763	127.56	207.89	3.13	0.004994
9	0.9584	0.9800	0.7466	131.56	210.40	3.09	0.004300
10	0.9799	0.0000	0.0000	134.06	0.00	2.83	0.002654

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-1.4967	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	201.99	226.20	4532.19	109740.00
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TABLE U-3: OPEN LOOP - STEP IN REFLEX FLOW - RUN 1

TIME = 60.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	HOLD-TIME	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 60.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	HOLD-TIME	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-3 CPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0268	0.2450	1.1289	73.99	126.61	14.91	0.005488
2	0.1650	0.5011	0.8409	200.58	143.03	3.80	0.007602
3	0.3399	0.7012	0.7707	217.00	162.32	3.68	0.021662
4	0.4909	0.8058	1.0102	236.27	176.86	3.55	0.010540
5	0.6723	0.8698	0.9136	100.50	188.27	3.38	0.011235
6	0.7939	0.9154	0.9186	111.90	197.40	3.26	0.008195
7	0.8743	0.9469	0.8916	121.02	203.97	3.18	0.005797
8	0.9268	0.9666	0.7783	127.59	207.97	3.12	0.003711
9	0.9587	0.9801	0.7442	131.58	210.45	3.09	0.002660
10	0.9800	0.0000	0.0000	134.06	0.00	2.83	0.002458

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-1.5077	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	201.91	226.12	4532.19	109748.50
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0272	0.2460	1.1272	73.93	126.67	14.90	0.004112
2	0.1657	0.5028	0.8417	200.59	143.18	3.80	0.008057
3	0.3413	0.7022	0.7705	217.09	162.44	3.67	0.013818
4	0.4917	0.8061	1.0103	236.35	176.94	3.55	0.008797
5	0.6731	0.8701	0.9137	100.53	188.34	3.38	0.008366
6	0.7945	0.9157	0.9189	111.93	197.47	3.26	0.006134
7	0.8747	0.9470	0.8913	121.05	204.03	3.18	0.004305
8	0.9271	0.9668	0.7798	127.60	208.02	3.12	0.002674
9	0.9589	0.9801	0.7424	131.60	210.49	3.09	0.002274
10	0.9801	0.0000	0.0000	134.06	0.00	2.83	0.001401

REFLUX	ERRCR	FEED	FEED CONC.
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134.06	-1.5158	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	201.84	226.06	4532.19	109755.02
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= 1417

TIME = 12.00

TABLE U-3 OPEN LOOP - STEP IN REFLUX FLOW - RUN 1

TIME = 80.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0275	C.2468	1.1260	73.88	126.73	14.90	0.003187
2	C.1662	C.5042	C.8424	200.60	143.28	3.80	0.005553
3	C.3423	C.7030	C.7703	217.16	162.54	3.67	0.011316
4	C.4924	C.8064	1.0105	236.40	177.00	3.55	0.006467
5	0.6737	C.8703	C.9137	100.56	188.40	3.38	0.006358
6	C.7949	0.9158	0.9191	111.96	197.52	3.26	0.004605
7	0.8750	0.9472	0.8911	121.07	204.07	3.18	0.003216
8	C.9273	0.9669	C.7810	127.62	208.06	3.12	0.001989
9	0.9591	0.9802	C.7412	131.61	210.52	3.09	0.001683
10	C.9802	C.0000	C.0000	134.06	0.00	2.83	0.001034

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-1.5217	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	201.80	226.01	4532.19	109760.00
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TIME = 85.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0278	C.2473	1.1250	73.85	126.76	14.90	0.002389
2	0.1667	0.5052	0.8429	200.61	143.37	3.80	0.004774
3	C.3431	C.7035	C.7702	217.22	162.61	3.67	0.007768
4	0.4929	0.8066	1.0106	236.45	177.04	3.55	0.005113
5	C.6741	0.8705	C.9137	100.57	188.45	3.38	0.004752
6	0.7952	0.9160	0.9192	111.98	197.56	3.26	0.003457
7	0.8752	0.9473	C.8909	121.09	204.11	3.18	0.002404
8	0.9274	0.9669	C.7818	127.63	208.10	3.12	0.001481
9	0.9592	0.9802	C.7402	131.62	210.55	3.09	0.001251
10	C.9802	C.0000	C.0000	134.06	0.00	2.83	0.000769

REFLUX	ERROR	FEED	FEED CONC.
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134.06	-1.5260	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	201.76	225.98	4532.19	109763.82
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TABLE D-3 OPEN LOOP - STEP IN REFLEX FLOW - 1

TIME = 85.00

PLATE	CONC	CONC EFFICI	LIQUID VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
REFLEX	ERROR	FEED	FEED CONC.		
134.06	-1.5517	150.30	0.2133		
STEAM	TEMPERATURE				
114.16	550.01		435.19		11.400.01

TIME = 85.00

PLATE	CONC	CONC EFFICI	LIQUID VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
REFLEX	ERROR	FEED	FEED CONC.		
134.06	-1.5560	150.3	0.2133		
STEAM	TEMPERATURE				
114.16	551.76		435.19		10463.85

TABLE U-4 CPEN LCOP - STEP IN REFLUX FLOW - RUN 2

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0280	0.2497	1.1269	73.71	126.50	14.90	0.000003
2	C.1681	0.5468	0.9492	200.21	146.54	3.80	0.000007
3	C.3732	0.7308	0.7979	220.25	165.87	3.65	0.000008
4	0.5146	0.8048	0.8651	239.58	176.72	3.53	0.000002
5	0.6705	0.8696	0.9230	100.14	188.49	3.38	0.000001
6	0.7938	0.9217	1.1210	111.90	199.38	3.26	-0.000000
7	C.8851	0.9483	C.7663	122.79	205.11	3.17	-0.000001
8	0.9293	0.9662	C.6951	128.52	208.89	3.12	-0.000000
9	C.9580	0.9803	C.7909	132.30	211.83	3.09	-0.000001
10	C.9803	0.0000	C.0000	135.25	0.00	2.83	-0.000001

REFLUX	ERRCR	FEED	FEED CONC.
135.25	-1.5260	150.30	0.5133

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
114.16	201.72	230.48	3794.56	109148.36

TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0175	0.2238	1.1824	63.15	124.94	14.92	-0.127380
2	C.1442	0.4910	C.9161	188.34	141.94	3.81	-0.239777
3	0.3310	0.6979	C.7901	205.48	161.54	3.68	-0.490066
4	C.4851	0.7938	0.8828	225.47	174.25	3.55	-0.318766
5	0.6444	0.8601	C.9238	88.15	185.87	3.41	-0.283869
6	C.7753	0.9145	1.0988	100.04	196.94	3.28	-0.208010
7	C.8738	0.9436	C.7740	111.32	203.12	3.18	-0.136034
8	0.9226	C.9625	C.6672	117.64	207.07	3.13	-0.082101
9	0.9533	0.9786	0.8250	121.68	210.48	3.10	-0.061603
10	C.9791	C.0000	C.0000	125.15	0.00	2.83	-0.038536

REFLUX	ERROR	FEED	FEED CONC.
125.15	0.1206	150.30	0.5133

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
114.16	203.47	232.24	3794.56	109164.90

TABLE U-4 OPEN LCOP - STEP IN REFLUX FLOW - RUN 2

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0098	0.1907	1.2232	64.28	122.88	14.94	-0.054890
2	0.1241	0.4389	0.8881	187.27	137.93	3.82	-0.234300
3	0.2938	0.6639	0.7833	202.46	157.58	3.71	-0.420557
4	0.4590	0.7830	0.8985	222.41	172.25	3.58	-0.322457
5	0.6221	0.8517	0.9245	87.05	183.95	3.43	-0.267331
6	0.7595	0.9082	1.0799	99.01	195.22	3.30	-0.180624
7	0.8633	0.9393	0.7812	110.46	201.74	3.19	-0.118382
8	0.9162	0.9588	0.6403	117.11	205.79	3.14	-0.072474
9	0.9483	0.9769	0.8608	121.23	209.65	3.10	-0.057803
10	0.9775	0.0000	0.0000	125.15	0.00	2.84	-0.039682

REFLUX	ERRCR	FEED	FEED CONC.
125.15	0.2889	150.30	0.5133

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBCILER	STEAM		
114.16	204.94	233.71	3794.56	109178.79

TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0067	0.1660	1.2395	64.96	121.43	14.94	-0.024080
2	0.1086	0.3910	0.8665	186.44	134.57	3.83	-0.161598
3	0.2609	0.6254	0.7772	199.68	153.25	3.73	-0.350124
4	0.4303	0.7709	0.9157	218.60	170.30	3.60	-0.330759
5	0.5989	0.8430	0.9252	85.65	182.22	3.45	-0.282367
6	0.7442	0.9020	1.0616	97.83	193.77	3.31	-0.183400
7	0.8535	0.9352	0.7879	109.56	200.68	3.20	-0.118114
8	0.9103	0.9554	0.6156	116.58	204.81	3.14	-0.069916
9	0.9435	0.9754	0.8951	120.80	209.11	3.11	-0.056811
10	0.9759	0.0000	0.0000	125.15	0.00	2.84	-0.036520

REFLUX	ERROR	FEED	FEED CONC.
125.15	0.4473	150.30	0.5133

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBCILER	STEAM		
114.16	205.62	234.39	3794.56	109185.19

TABLE 1 - STEP 1 - REFLOW FLOW - RUN 3

PLATE	CONCX	EFFICI	LIQUID	VAPOR	REFLOW
10	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	ERROR	FEED	FEED CONC.		
152.12	0.0000	150.30	0.0000		
STEAM	TEMPERATURE				
114.16	504.94	53.71	104.00		

TIME = 15.00

PLATE	CONCX	EFFICI	LIQUID	VAPOR	REFLOW
10	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	ERROR	FEED	FEED CONC.		
152.12	0.0000	15.3	0.0000		
STEAM	TEMPERATURE				
114.16	504.94	53.71	104.00		

TABLE U-4 CPEN LCOP - STEP IN REFLUX FLOW - RUN 2

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0052	0.1483	1.2477	65.66	120.41	14.95	-0.014297
2	0.0966	0.3554	0.8499	186.10	132.24	3.84	-0.124545
3	0.2356	0.5908	0.7726	198.00	149.49	3.75	-0.260789
4	0.4041	0.7595	0.9314	215.43	168.54	3.62	-0.291406
5	0.5758	0.8346	0.9259	84.43	180.58	3.47	-0.272305
6	0.7292	0.8959	1.0436	96.71	192.34	3.33	-0.177706
7	0.8437	0.9312	0.7946	108.65	199.63	3.21	-0.116957
8	0.9045	0.9520	0.5914	116.06	203.83	3.15	-0.068958
9	0.9387	0.9739	0.9295	120.34	208.59	3.11	-0.057808
10	0.9744	0.0000	0.0000	125.15	0.00	2.84	-0.035030

REFLUX	ERROR	FEED	FEED CONC.
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125.15	0.5958	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	205.96	234.73	3794.56	109188.40
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0043	0.1363	1.2524	66.51	119.70	14.95	-0.008043
2	0.0885	0.3275	0.8386	186.23	130.47	3.84	-0.080950
3	0.2161	0.5625	0.7690	197.04	146.84	3.76	-0.210442
4	0.3825	0.7498	0.9444	213.55	166.98	3.64	-0.232711
5	0.5549	0.8270	0.9265	83.58	178.99	3.49	-0.230791
6	0.7151	0.8902	1.0268	95.80	190.91	3.34	-0.161722
7	0.8343	0.9274	0.8010	107.88	198.50	3.22	-0.107647
8	0.8989	0.9486	0.5681	115.58	202.74	3.15	-0.063584
9	0.9340	0.9725	0.9637	119.89	207.95	3.12	-0.055062
10	0.9729	0.0000	0.0000	125.15	0.00	2.84	-0.037833

REFLUX	ERROR	FEED	FEED CONC.
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125.15	0.7407	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.17	234.94	3794.56	109190.37
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TABLE II-4 OPEN LOOP - STEP IN REFLEX FLUX

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	LO- DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLEX						
152.12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FLOW						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	LO- DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLEX						
152.12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FLOW						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOAD						
114.16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-4 OPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0038	C.1281	1.2553	67.12	119.23	14.95	-0.005223
2	C.0829	C.3070	0.8308	186.36	129.21	3.85	-0.057881
3	C.2018	0.5380	C.7663	196.38	144.70	3.77	-0.146589
4	0.3646	C.7415	0.9552	211.97	165.81	3.66	-0.189194
5	0.5376	0.8192	C.9271	82.93	177.50	3.51	-0.191099
6	C.7012	0.8846	1.0101	94.79	189.62	3.35	-0.161708
7	0.8253	0.9237	0.8072	107.07	197.55	3.23	-0.107783
8	0.8936	C.9453	C.5458	115.11	201.81	3.16	-0.063417
9	0.9293	C.9712	C.9973	119.44	207.47	3.12	-0.056732
10	0.9716	0.0000	C.0000	125.15	0.00	2.84	-0.029808

REFLUX	ERRCR	FEED	FEED CONC.
125.15	0.8752	150.30	0.5133

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
114.16	206.30	235.07	3794.56	109191.60

TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0034	C.1219	1.2572	67.71	118.87	14.95	-0.003622
2	C.0786	C.2920	0.8248	186.59	128.27	3.85	-0.045651
3	0.1911	C.5196	C.7644	196.01	143.15	3.78	-0.110701
4	C.3507	C.7350	C.9635	210.96	164.94	3.67	-0.146356
5	0.5231	0.8129	C.9275	82.57	176.36	3.52	-0.158728
6	C.6888	C.8795	C.9952	94.14	188.50	3.37	-0.134462
7	0.8167	0.9204	0.8131	106.40	196.71	3.24	-0.097675
8	0.8885	0.9421	C.5247	114.71	200.95	3.16	-0.056624
9	0.9247	0.9699	1.0304	119.01	207.04	3.13	-0.054641
10	0.9703	0.0000	C.0000	125.15	0.00	2.84	-0.027422

REFLUX	ERRCR	FEED	FEED CONC.
125.15	1.0017	150.30	0.5133

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
114.16	206.38	235.16	3794.56	109192.43

TABLE 10-1. CSTR LOOP - AFTER 10 REFLEX FLUX - 1000 S

TIME = 30.00

PLATE	CONCX	CONCX EFFICI	LIQUID	VAPOR	REFL -	RELATIVE
1	0.0038	1.1281	1.2523	67.15	119.23	14.95 - 0.00000
2	0.0038	1.1281	0.8308	186.36	129.21	14.95 - 0.00000
3	0.0038	1.1281	0.7863	196.38	139.21	14.95 - 0.00000
4	0.0038	1.1281	0.7418	211.97	149.21	14.95 - 0.00000
5	0.0038	1.1281	0.6973	227.56	159.21	14.95 - 0.00000
6	0.0038	1.1281	0.6528	243.15	169.21	14.95 - 0.00000
7	0.0038	1.1281	0.6083	258.74	179.21	14.95 - 0.00000
8	0.0038	1.1281	0.5638	274.33	189.21	14.95 - 0.00000
9	0.0038	1.1281	0.5193	289.92	199.21	14.95 - 0.00000
10	0.0038	1.1281	0.4748	305.51	209.21	14.95 - 0.00000
REFLUX	125.12	0.8725	120.30	0.2133		
STEAM FLOW						
REFLECTOR						
TEMPERATURE						
C EFFICIENT						
HEAT LOAD						

TIME = 35.00

PLATE	CONCX	CONCX EFFICI	LIQUID	VAPOR	REFL -	RELATIVE
1	0.0038	1.1281	1.2523	67.15	118.57	14.95 - 0.00000
2	0.0038	1.1281	0.8308	186.36	128.57	14.95 - 0.00000
3	0.0038	1.1281	0.7863	196.38	138.57	14.95 - 0.00000
4	0.0038	1.1281	0.7418	211.97	148.57	14.95 - 0.00000
5	0.0038	1.1281	0.6973	227.56	158.57	14.95 - 0.00000
6	0.0038	1.1281	0.6528	243.15	168.57	14.95 - 0.00000
7	0.0038	1.1281	0.6083	258.74	178.57	14.95 - 0.00000
8	0.0038	1.1281	0.5638	274.33	188.57	14.95 - 0.00000
9	0.0038	1.1281	0.5193	289.92	198.57	14.95 - 0.00000
10	0.0038	1.1281	0.4748	305.51	208.57	14.95 - 0.00000
REFLUX	125.12	1.0013	119.3	0.2133		
STEAM FLOW						
REFLECTOR						
TEMPERATURE						
C EFFICIENT						
HEAT LOAD						

TABLE U-4 OPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0031	0.1173	1.2585	68.23	118.61	14.95	-0.002640
2	C.0754	0.2806	0.8204	186.84	127.56	3.85	-0.030228
3	C.1831	0.5060	C.7629	195.81	142.08	3.79	-0.083385
4	C.3405	C.7293	C.9696	210.38	164.16	3.67	-0.099289
5	C.5106	0.8078	C.9279	82.24	175.42	3.53	-0.142865
6	C.6785	0.8753	C.9828	93.63	187.54	3.37	-0.116592
7	0.8091	0.9176	C.8183	105.87	195.98	3.25	-0.084538
8	C.8841	C.9393	C.5062	114.39	200.17	3.17	-0.049543
9	0.9206	0.9689	1.0604	118.63	206.64	3.13	-0.047814
10	C.9692	C.0000	C.0000	125.15	0.00	2.84	-0.024229

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.1163	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.44	235.22	3794.56	109193.01
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0030	0.1142	1.2595	68.68	118.43	14.95	-0.001469
2	C.0732	C.2731	0.8173	187.12	127.10	3.85	-0.021279
3	C.1778	0.4956	C.7619	195.80	141.27	3.79	-0.051966
4	C.3330	C.7246	C.9741	210.00	163.53	3.68	-0.076845
5	C.4997	0.8033	C.9282	82.02	174.59	3.54	-0.114999
6	C.6694	0.8715	C.9720	93.19	186.70	3.38	-0.099640
7	C.8025	0.9151	0.8228	105.40	195.34	3.25	-0.074144
8	C.8802	0.9368	C.4901	114.11	199.48	3.17	-0.043305
9	C.9168	0.9679	1.0873	118.29	206.29	3.14	-0.042689
10	C.9682	C.0000	C.0000	125.15	0.00	2.84	-0.021201

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.2147	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.49	235.26	3794.56	109193.40
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TABLE U-4: OPEN LOOP - 1ST IN - 1ST OUT - 1ST IN - 1ST OUT

TIME = 40.0

PLATE	CONC	CONC EFFICI	LIQID	VAPOR	1ST IN - 1ST OUT
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	1.1163	1.1163	1.1163	1.1163	1.1163
FEED	1.1163	1.1163	1.1163	1.1163	1.1163
TEMPERATURE	1.1163	1.1163	1.1163	1.1163	1.1163
COEFFICIENT	1.1163	1.1163	1.1163	1.1163	1.1163
HEAT LOAD	1.1163	1.1163	1.1163	1.1163	1.1163

TIME = 45.00

PLATE	CONC	CONC EFFICI	LIQID	VAPOR	1ST IN - 1ST OUT
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	1.2141	1.2141	1.2141	1.2141	1.2141
FEED	1.2141	1.2141	1.2141	1.2141	1.2141
TEMPERATURE	1.2141	1.2141	1.2141	1.2141	1.2141
COEFFICIENT	1.2141	1.2141	1.2141	1.2141	1.2141
HEAT LOAD	1.2141	1.2141	1.2141	1.2141	1.2141

TABLE U-4 OPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0029	0.1121	1.2600	69.09	118.31	14.95	-0.000949
2	C.0717	0.2680	0.8153	187.41	126.79	3.85	-0.015183
3	C.1741	0.4885	0.7612	195.89	140.72	3.79	-0.037528
4	C.3276	0.7212	0.9774	209.85	163.12	3.69	-0.055354
5	0.4914	0.7998	0.9285	81.99	173.96	3.55	-0.086768
6	0.6621	0.8684	0.9631	92.91	186.03	3.39	-0.078560
7	0.7969	0.9130	0.8266	105.05	194.80	3.26	-0.061173
8	0.8769	0.9346	0.4761	113.88	198.88	3.18	-0.036623
9	0.9135	0.9671	1.1110	118.00	206.00	3.14	-0.037275
10	0.9673	0.0000	0.0000	125.15	0.00	2.84	-0.017990

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.3001	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.51	235.29	3794.56	109193.62
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TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0028	0.1106	1.2603	69.40	118.23	14.95	-0.000667
2	C.0707	0.2643	0.8138	187.63	126.56	3.85	-0.009120
3	C.1714	0.4834	0.7608	195.98	140.34	3.79	-0.031197
4	C.3236	0.7187	0.9798	209.77	162.82	3.69	-0.038621
5	0.4851	0.7971	0.9287	81.99	173.50	3.55	-0.065822
6	0.6563	0.8660	0.9562	92.71	185.51	3.40	-0.060914
7	0.7923	0.9113	0.8298	104.79	194.38	3.26	-0.048863
8	0.8741	0.9327	0.4645	113.71	198.40	3.18	-0.030056
9	0.9107	0.9664	1.1313	117.76	205.76	3.14	-0.029617
10	0.9666	0.0000	0.0000	125.15	0.00	2.85	-0.017198

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.3722	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.52	235.30	3794.56	109193.77
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TABLE 10-4. FLOW IN REFLUX FLOW - RUN 2

TIME = 25.00

PLATE	COND	EFFICI	LIQID	VAPOUR	HEAT - 4	DERIVATIVE
1	0.0029	0.1100	0.0000	0.0000	0.0000	0.0000
2	0.0017	0.0813	0.0000	0.0000	0.0000	0.0000
3	0.0014	0.0484	0.0000	0.0000	0.0000	0.0000
4	0.0010	0.0291	0.0000	0.0000	0.0000	0.0000
5	0.0007	0.0181	0.0000	0.0000	0.0000	0.0000
6	0.0005	0.0110	0.0000	0.0000	0.0000	0.0000
7	0.0003	0.0061	0.0000	0.0000	0.0000	0.0000
8	0.0002	0.0037	0.0000	0.0000	0.0000	0.0000
9	0.0001	0.0022	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	1.3355	15.00	0.2133			
FEED						
FEED CONC.						
STEAM						
RECYCLER						
TEMPERATURE						
COEFFICIENT						
HEAT LOAD						
114.16	506.21	232.29	3794.26	100193.65		

TIME = 25.00

PLATE	COND	EFFICI	LIQID	VAPOUR	HEAT - 4	DERIVATIVE
1	0.0028	0.1100	0.0000	0.0000	0.0000	0.0000
2	0.0017	0.0813	0.0000	0.0000	0.0000	0.0000
3	0.0014	0.0484	0.0000	0.0000	0.0000	0.0000
4	0.0010	0.0291	0.0000	0.0000	0.0000	0.0000
5	0.0007	0.0181	0.0000	0.0000	0.0000	0.0000
6	0.0005	0.0110	0.0000	0.0000	0.0000	0.0000
7	0.0003	0.0061	0.0000	0.0000	0.0000	0.0000
8	0.0002	0.0037	0.0000	0.0000	0.0000	0.0000
9	0.0001	0.0022	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	1.3355	15.00	0.2133			
FEED						
FEED CONC.						
STEAM						
RECYCLER						
TEMPERATURE						
COEFFICIENT						
HEAT LOAD						
114.16	506.21	232.29	3794.26	100193.65		

TABLE U-4 CPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0028	0.1095	1.2606	69.66	118.17	14.95	-0.000429
2	0.0659	0.2616	0.8127	187.83	126.41	3.85	-0.008012
3	0.1695	0.4796	0.7604	196.08	140.05	3.79	-0.019888
4	0.3207	0.7168	0.9815	209.73	162.61	3.69	-0.029631
5	0.4804	0.7951	0.9288	82.01	173.14	3.56	-0.049003
6	0.6518	0.8641	0.9509	92.59	185.11	3.40	-0.046496
7	0.7887	0.9099	0.8323	104.60	194.05	3.27	-0.038182
8	0.8719	0.9313	0.4552	113.58	198.01	3.18	-0.023662
9	0.9084	0.9659	1.1478	117.56	205.57	3.14	-0.025004
10	0.9660	0.0000	0.0000	125.15	0.00	2.85	-0.012006

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.4301	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.54	235.31	3794.56	109193.87
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1087	1.2607	69.87	118.12	14.95	-0.000252
2	0.0693	0.2598	0.8119	187.99	126.30	3.85	-0.007929
3	0.1681	0.4769	0.7601	196.17	139.84	3.80	-0.010035
4	0.3186	0.7155	0.9828	209.72	162.45	3.69	-0.023586
5	0.4768	0.7937	0.9289	82.05	172.89	3.56	-0.035864
6	0.6484	0.8626	0.9463	92.52	184.80	3.40	-0.034896
7	0.7859	0.9089	0.8342	104.46	193.79	3.27	-0.029214
8	0.8701	0.9301	0.4479	113.48	197.70	3.18	-0.018319
9	0.9066	0.9655	1.1610	117.41	205.42	3.15	-0.019712
10	0.9656	0.0000	0.0000	125.15	0.00	2.85	-0.009368

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.4763	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.54	235.32	3794.56	109193.93
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TABLE 1. OPEN LOOP - STEP IN REFLUX FLOW - 5

TIME = 65.00

PLATE	CONC	EFFICI	LIQ	VAPOR	F - 4	DERIVATIVE
1	0.0028	1.2800	69.66	116.14	14.95	-0.00025
2	0.0029	1.2810	187.83	116.41	8.85	-0.00029
3	0.0030	1.2820	1.00	116.68	0.80	-0.0003
4	0.0031	1.2830	1.00	116.95	0.80	-0.0003
5	0.0032	1.2840	85.01	117.22	3.90	-0.0003
6	0.0033	1.2850	187.83	117.49	8.85	-0.0003
7	0.0034	1.2860	1.00	117.76	0.80	-0.0003
8	0.0035	1.2870	113.41	118.03	3.90	-0.0003
9	0.0036	1.2880	117.41	118.30	8.85	-0.0003
10	0.0037	1.2890	117.41	118.57	8.85	-0.0003

REFLUX FLOW 114.16
FEED CONC. 0.2133

STEAM FLOW RECTOR 256.24
TEMPERATURE 232.81
COEFFICIENT 3794.24
HEAT LOAD 10419.84

TIME = 65.00

PLATE	CONC	EFFICI	LIQ	VAPOR	F - 4	DERIVATIVE
1	0.0028	1.2800	69.66	116.14	14.95	-0.00025
2	0.0029	1.2810	187.83	116.41	8.85	-0.00029
3	0.0030	1.2820	1.00	116.68	0.80	-0.0003
4	0.0031	1.2830	1.00	116.95	0.80	-0.0003
5	0.0032	1.2840	85.01	117.22	3.90	-0.0003
6	0.0033	1.2850	187.83	117.49	8.85	-0.0003
7	0.0034	1.2860	1.00	117.76	0.80	-0.0003
8	0.0035	1.2870	113.41	118.03	3.90	-0.0003
9	0.0036	1.2880	117.41	118.30	8.85	-0.0003
10	0.0037	1.2890	117.41	118.57	8.85	-0.0003

REFLUX FLOW 114.16
FEED CONC. 0.2133

STEAM FLOW RECTOR 256.24
TEMPERATURE 232.81
COEFFICIENT 3794.24
HEAT LOAD 10419.84

TABLE U-4 CPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1081	1.2608	70.02	118.09	14.95	-0.000169
2	0.0689	0.2584	0.8113	188.12	126.22	3.85	-0.006312
3	0.1670	0.4750	0.7599	196.24	139.69	3.80	-0.006202
4	0.3170	0.7145	0.9837	209.73	162.33	3.69	-0.017558
5	0.4742	0.7926	0.9290	82.08	172.69	3.56	-0.025795
6	0.6459	0.8616	0.9438	92.46	184.57	3.41	-0.026146
7	0.7837	0.9081	0.8356	104.36	193.59	3.27	-0.022481
8	0.8688	0.9292	0.4423	113.41	197.46	3.19	-0.014269
9	0.9052	0.9651	1.1713	117.30	205.30	3.15	-0.014587
10	0.9652	0.0000	0.0000	125.15	0.00	2.85	-0.008372

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.5121	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.32	3794.56	109193.98
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1077	1.2609	70.14	118.07	14.95	-0.000121
2	0.0686	0.2574	0.8109	188.21	126.15	3.85	-0.002881
3	0.1663	0.4737	0.7598	196.30	139.60	3.80	-0.007130
4	0.3160	0.7139	0.9843	209.75	162.25	3.69	-0.010729
5	0.4724	0.7917	0.9291	82.11	172.55	3.57	-0.018529
6	0.6440	0.8607	0.9415	92.42	184.39	3.41	-0.019941
7	0.7821	0.9075	0.8368	104.28	193.45	3.27	-0.017425
8	0.8677	0.9285	0.4379	113.36	197.28	3.19	-0.010977
9	0.9041	0.9649	1.1793	117.20	205.22	3.15	-0.011897
10	0.9650	0.0000	0.0000	125.15	0.00	2.85	-0.005592

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.5396	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.01
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TABLE 11 - STEP 11: REFLUX FLOW - 11.11

TIME = 10.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	152.15	1.5151	1.5151	0.5133			
FEED							
ERROR							
STEAM							
FLW							
RECYCLER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
114.16	506.55	532.35	114.16	114.16	114.16	114.16	114.16

TIME = 10.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	152.15	1.5336	150.3	0.5133			
FEED							
ERROR							
STEAM							
FLW							
RECYCLER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
114.16	506.55	532.35	114.16	114.16	114.16	114.16	114.16

TABLE U-4 CPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 80.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1075	1.2609	70.24	118.06	14.95	-0.000082
2	0.0684	0.2567	0.8106	188.29	126.11	3.85	-0.000016
3	0.1658	0.4728	0.7597	196.35	139.54	3.80	-0.008415
4	0.3152	0.7134	0.9848	209.77	162.19	3.69	-0.005476
5	0.4711	0.7911	0.9291	82.14	172.45	3.57	-0.013445
6	0.6426	0.8601	0.9398	92.40	184.26	3.41	-0.014572
7	0.7808	0.9071	0.8376	104.23	193.33	3.28	-0.013027
8	0.8669	0.9280	0.4345	113.32	197.14	3.19	-0.008310
9	0.9032	0.9647	1.1855	117.13	205.15	3.15	-0.009143
10	0.9647	0.0000	0.0000	125.15	0.00	2.85	-0.004258

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.5609	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.02
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TIME = 85.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1073	1.2609	70.31	118.05	14.95	-0.000020
2	0.0683	0.2563	0.8104	188.35	126.09	3.85	-0.001110
3	0.1655	0.4721	0.7597	196.39	139.48	3.80	-0.003425
4	0.3147	0.7131	0.9851	209.79	162.16	3.70	-0.004842
5	0.4702	0.7907	0.9291	82.17	172.37	3.57	-0.009263
6	0.6415	0.8596	0.9386	92.39	184.16	3.41	-0.010466
7	0.7799	0.9067	0.8383	104.19	193.25	3.28	-0.009524
8	0.8663	0.9276	0.4320	113.29	197.04	3.19	-0.006178
9	0.9025	0.9645	1.1902	117.08	205.10	3.15	-0.006776
10	0.9646	0.0000	0.0000	125.15	0.00	2.85	-0.003228

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.5769	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.03
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TABLE U-4 OPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 90.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1072	1.2609	70.36	118.04	14.95	0.000019
2	0.0682	0.2561	0.8103	188.40	126.08	3.85	-0.003025
3	0.1653	0.4717	0.7596	196.44	139.44	3.80	0.002086
4	0.3144	0.7129	0.9853	209.81	162.13	3.70	-0.005520
5	0.4695	0.7904	0.9292	82.19	172.32	3.57	-0.006108
6	0.6408	0.8593	0.9377	92.39	184.09	3.41	-0.007421
7	0.7792	0.9065	0.8387	104.16	193.18	3.28	-0.006835
8	0.8659	0.9273	0.4302	113.27	196.96	3.19	-0.004522
9	0.9021	0.9644	1.1936	117.05	205.06	3.15	-0.004950
10	0.9645	0.0000	0.0000	125.15	0.00	2.85	-0.002370

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.5889	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.03
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TIME = 95.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1072	1.2609	70.40	118.04	14.95	0.000022
2	0.0681	0.2559	0.8103	188.43	126.07	3.85	-0.002606
3	0.1651	0.4714	0.7596	196.46	139.43	3.80	0.002501
4	0.3141	0.7127	0.9854	209.82	162.11	3.70	-0.004232
5	0.4691	0.7902	0.9292	82.21	172.28	3.57	-0.004102
6	0.6403	0.8591	0.9370	92.39	184.04	3.41	-0.005184
7	0.7787	0.9063	0.8391	104.15	193.14	3.28	-0.004844
8	0.8656	0.9271	0.4288	113.25	196.90	3.19	-0.003247
9	0.9017	0.9643	1.1962	117.02	205.03	3.15	-0.003423
10	0.9644	0.0000	0.0000	125.15	0.00	2.85	-0.001971

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.5976	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.03
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TIME - 20.0

TABLE U-4 CPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 100.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0027	0.1071	1.2609	70.42	118.03	14.95	0.000003
2	0.0681	0.2558	0.8102	188.46	126.05	3.85	-0.000352
3	0.1651	0.4713	0.7596	196.48	139.42	3.80	-0.000895
4	0.3140	0.7126	0.9855	209.84	162.10	3.70	-0.001424
5	0.4688	0.7901	0.9292	82.23	172.26	3.57	-0.002944
6	0.6399	0.8589	0.9366	92.39	184.01	3.41	-0.003556
7	0.7784	0.9062	0.8393	104.14	193.11	3.28	-0.003388
8	0.8653	0.9269	0.4279	113.25	196.86	3.19	-0.002277
9	0.9015	0.9643	1.1980	117.00	205.01	3.15	-0.002547
10	0.9643	0.0000	0.0000	125.15	0.00	2.85	-0.001215

REFLUX	ERRCR	FEED	FEED CONC.
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125.15	1.6038	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.03
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TIME = 105.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0027	0.1071	1.2609	70.44	118.03	14.95	-0.000013
2	0.0681	0.2557	0.8102	188.47	126.04	3.85	0.001575
3	0.1650	0.4712	0.7596	196.49	139.42	3.80	-0.003897
4	0.3139	0.7125	0.9856	209.86	162.09	3.70	0.000868
5	0.4686	0.7900	0.9292	82.24	172.24	3.57	-0.002167
6	0.6397	0.8588	0.9363	92.39	183.98	3.41	-0.002385
7	0.7781	0.9061	0.8395	104.13	193.09	3.28	-0.002330
8	0.8652	0.9268	0.4272	113.24	196.84	3.19	-0.001577
9	0.9013	0.9643	1.1992	116.99	205.00	3.15	-0.001788
10	0.9643	0.0000	0.0000	125.15	0.00	2.85	-0.000846

REFLUX	ERROR	FEED	FEED CONC.
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125.15	1.6083	150.30	0.5133
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.16	206.55	235.33	3794.56	109194.03
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TABLE U-4 OPEN LOOP - STEP IN REFLUX FLOW - RUN 2

TIME = 110.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0027	0.1071	1.2609	70.46	118.03	14.95	0.000007
2	0.0681	0.2557	0.8102	188.49	126.05	3.85	0.000040
3	0.1650	0.4711	0.7596	196.50	139.41	3.80	-0.000506
4	0.3139	0.7125	0.9856	209.86	162.09	3.70	-0.000389
5	0.4685	0.7899	0.9292	82.25	172.23	3.57	-0.001239
6	0.6395	0.8587	0.9361	92.39	183.97	3.41	-0.001572
7	0.7780	0.9060	0.8396	104.13	193.07	3.28	-0.001556
8	0.8651	0.9267	0.4268	113.24	196.82	3.19	-0.001074
9	0.9012	0.9642	1.2001	116.98	204.99	3.15	-0.001205
10	0.9642	0.0000	0.0000	125.15	0.00	2.85	-0.000588

REFLUX	ERROR	FEED	FEED CONC.
125.15	1.6113	150.30	0.5133

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
114.16	206.55	235.33	3794.56	109194.03

TIME = 115.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0027	0.1071	1.2609	70.47	118.03	14.95	0.000026
2	0.0681	0.2557	0.8101	188.50	126.05	3.85	-0.002036
3	0.1649	0.4710	0.7596	196.52	139.40	3.80	0.003509
4	0.3138	0.7125	0.9856	209.87	162.09	3.70	-0.002270
5	0.4684	0.7899	0.9292	82.25	172.22	3.57	-0.000531
6	0.6394	0.8587	0.9360	92.39	183.96	3.41	-0.001049
7	0.7779	0.9060	0.8396	104.12	193.06	3.28	-0.001029
8	0.8650	0.9267	0.4264	113.23	196.80	3.19	-0.000727
9	0.9011	0.9642	1.2007	116.97	204.98	3.15	-0.000776
10	0.9642	0.0000	0.0000	125.15	0.00	2.85	-0.000459

REFLUX	ERROR	FEED	FEED CONC.
125.15	1.6134	150.30	0.5133

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
114.16	206.55	235.33	3794.56	109194.03

TIME = 111.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HEAT-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX 152.15
FEED 150.30
FEED CONC. 0.0133

STEAM RECYCLER STEAM TEMPERATURE
COEFFICIENT HEAT LOAD

114.16 506.25 332.33

TIME = 112.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HEAT-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX 152.15
FEED 150.30
FEED CONC. 0.0133

STEAM RECYCLER STEAM TEMPERATURE
COEFFICIENT HEAT LOAD

114.16 506.25 332.33

TABLE U-5 OPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0298	0.2092	1.0376	73.66	126.45	14.90	0.000002
2	0.1432	0.5014	0.9471	200.11	145.18	3.81	0.000005
3	0.3427	0.7009	0.7583	218.84	164.57	3.67	0.000003
4	0.4934	0.7958	0.8702	238.23	177.54	3.55	0.000003
5	0.6585	0.8623	0.8688	101.80	189.13	3.39	-0.000001
6	0.7833	0.9101	0.8840	113.39	198.50	3.27	0.000000
7	0.8668	0.9443	0.9116	122.76	205.52	3.19	-0.000001
8	0.9232	0.9641	0.7288	129.78	209.33	3.13	-0.000001
9	0.9549	0.9804	0.9035	133.59	212.36	3.10	-0.000001
10	0.9804	0.0000	0.0000	136.62	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
136.62	1.6134	149.40	0.5117

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
115.51	201.44	219.02	6352.27	111721.27

TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0445	0.2874	1.0622	89.71	122.30	14.87	0.196011
2	0.1987	0.5856	0.9254	211.63	142.22	3.78	0.695676
3	0.4012	0.7463	0.7801	231.10	159.13	3.63	0.678893
4	0.5272	0.8161	0.9459	247.45	169.24	3.52	0.360503
5	0.6903	0.8754	0.8915	107.83	179.35	3.36	0.411966
6	0.8034	0.9170	0.8562	117.54	187.11	3.25	0.274325
7	0.8772	0.9501	0.9778	125.01	193.61	3.18	0.138616
8	0.9313	0.9667	0.6721	131.36	196.52	3.12	0.103427
9	0.9586	0.9814	0.8530	134.16	199.02	3.09	0.047312
10	0.9810	0.0000	0.0000	136.62	0.00	2.83	0.020646

REFLUX	ERROR	FEED	FEED CONC.
136.62	-0.0663	149.40	0.5117

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
107.61	199.24	215.65	6352.27	104219.58

TABLE U-5 OPEN LCOP - STEP IN STEAM FLOW - RUN 1

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0591	0.3614	1.0864	87.01	126.91	14.84	0.168546
2	0.2505	0.6451	0.9051	213.56	149.05	3.74	0.499350
3	0.4485	0.7745	0.7978	235.37	163.50	3.59	0.439978
4	0.5510	0.8301	0.9997	249.42	172.51	3.50	0.227518
5	0.7190	0.8869	0.9120	108.82	182.70	3.34	0.258938
6	0.8232	0.9240	0.8286	118.75	189.88	3.23	0.192020
7	0.8878	0.9556	1.0447	125.73	196.34	3.17	0.113892
8	0.9393	0.9695	0.6162	132.07	198.79	3.11	0.084386
9	0.9621	0.9824	0.8037	134.42	201.02	3.09	0.040081
10	0.9821	0.0000	0.0000	136.62	0.00	2.83	0.024542

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	-0.1677	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	197.14	213.56	6352.27	104305.76
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TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0716	0.4111	1.1073	84.66	130.28	14.81	0.129293
2	0.2866	0.6776	0.8910	214.66	152.78	3.72	0.371599
3	0.4761	0.7897	0.8081	236.89	166.38	3.56	0.255584
4	0.5652	0.8371	1.0315	250.27	174.49	3.48	0.126898
5	0.7353	0.8933	0.9237	108.86	184.92	3.32	0.145501
6	0.8356	0.9287	0.8113	119.14	191.96	3.22	0.114617
7	0.8957	0.9596	1.0942	126.06	198.47	3.16	0.075591
8	0.9453	0.9717	0.5741	132.49	200.64	3.11	0.059845
9	0.9651	0.9833	0.7624	134.60	202.69	3.08	0.030553
10	0.9830	0.0000	0.0000	136.62	0.00	2.83	0.020694

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	-0.2599	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	195.32	211.75	6352.27	104380.14
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TABLE II-2. OPEN LOOP - STEP IN STEAM FLOW - 10.0

TIME = 10.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	LI-UP	DERIVATIVE
10	0.9821	0.0000	136.62	0.00	0.00	0.000000
9	0.9821	0.0000	136.62	0.00	0.00	0.000000
8	0.9821	0.0000	136.62	0.00	0.00	0.000000
7	0.9821	0.0000	136.62	0.00	0.00	0.000000
6	0.9821	0.0000	136.62	0.00	0.00	0.000000
5	0.9821	0.0000	136.62	0.00	0.00	0.000000
4	0.9821	0.0000	136.62	0.00	0.00	0.000000
3	0.9821	0.0000	136.62	0.00	0.00	0.000000
2	0.9821	0.0000	136.62	0.00	0.00	0.000000
1	0.9821	0.0000	136.62	0.00	0.00	0.000000
REFLUX	ERRR	FEED	FEED CONC.			
136.62	-0.1677	149.40	0.2117			
STEAM FLOW	REFILLER	STEAM	TEMPERATURE	Coefficient	HEAT LOAD	
107.61	197.14	11.72	822.27	104.37	76	

TIME = 12.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	LI-UP	DERIVATIVE
10	0.9831	0.0000	136.62	0.00	0.00	0.000000
9	0.9831	0.0000	136.62	0.00	0.00	0.000000
8	0.9831	0.0000	136.62	0.00	0.00	0.000000
7	0.9831	0.0000	136.62	0.00	0.00	0.000000
6	0.9831	0.0000	136.62	0.00	0.00	0.000000
5	0.9831	0.0000	136.62	0.00	0.00	0.000000
4	0.9831	0.0000	136.62	0.00	0.00	0.000000
3	0.9831	0.0000	136.62	0.00	0.00	0.000000
2	0.9831	0.0000	136.62	0.00	0.00	0.000000
1	0.9831	0.0000	136.62	0.00	0.00	0.000000
REFLUX	ERRR	FEED	FEED CONC.			
136.62	-0.2229	149.40	0.2117			
STEAM FLOW	REFILLER	STEAM	TEMPERATURE	Coefficient	HEAT LOAD	
107.61	197.14	11.72	822.27	104.37	76	

TABLE U-5 CPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0809	0.4466	1.1229	83.16	132.83	14.79	0.103729
2	0.3131	0.6970	0.8805	215.77	155.11	3.70	0.249985
3	0.4929	0.7982	0.8144	237.85	168.03	3.55	0.144794
4	0.5732	0.8410	1.0496	250.64	175.64	3.47	0.067554
5	0.7447	0.8971	0.9304	108.79	186.24	3.31	0.083622
6	0.8433	0.9316	0.8007	119.30	193.21	3.21	0.070767
7	0.9008	0.9621	1.1265	126.20	199.78	3.15	0.048056
8	0.9493	0.9733	0.5458	132.72	201.80	3.10	0.037942
9	0.9672	0.9840	0.7329	134.70	203.74	3.08	0.023149
10	0.9838	0.0000	0.0000	136.62	0.00	2.83	0.014555

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.3384	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	193.98	210.42	6352.27	104434.95
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0883	0.4696	1.1352	82.18	134.59	14.78	0.073626
2	0.3303	0.7082	0.8738	216.62	156.57	3.68	0.168649
3	0.5024	0.8028	0.8180	238.46	168.98	3.54	0.092984
4	0.5776	0.8431	1.0594	250.78	176.30	3.47	0.041275
5	0.7500	0.8993	0.9342	108.67	187.03	3.31	0.048734
6	0.8478	0.9333	0.7943	119.34	193.98	3.21	0.041810
7	0.9040	0.9636	1.1467	126.25	200.60	3.15	0.029682
8	0.9519	0.9742	0.5277	132.84	202.55	3.10	0.024072
9	0.9687	0.9845	0.7128	134.76	204.42	3.08	0.013521
10	0.9843	0.0000	0.0000	136.62	0.00	2.83	0.010919

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.3911	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	193.05	209.50	6352.27	104473.14
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TABLE 1 - STEP IN STEAM FLOW - 1

TIME = 50.00

FLAT	CLCX	CONC	EFFICI	LIQID	VAPOR	TEMP	HEAT FLOW
1	0.0809	0.0809	1.1553	83.16	111.11	14.73	0.00000
2	0.0831	0.0831	1.1553	83.16	111.11	14.73	0.00000
3	0.0853	0.0853	1.1553	83.16	111.11	14.73	0.00000
4	0.0875	0.0875	1.1553	83.16	111.11	14.73	0.00000
5	0.0897	0.0897	1.1553	83.16	111.11	14.73	0.00000
6	0.0919	0.0919	1.1553	83.16	111.11	14.73	0.00000
7	0.0941	0.0941	1.1553	83.16	111.11	14.73	0.00000
8	0.0963	0.0963	1.1553	83.16	111.11	14.73	0.00000
9	0.0985	0.0985	1.1553	83.16	111.11	14.73	0.00000
10	0.0838	0.0838	1.1553	83.16	111.11	14.73	0.00000
REFLUX	ERRR	FEED	FEED CONC.				
136.65	-0.3384	149.40	0.3111				
STEAM	TEMPERATURE						
FLW	REFLUX	STEAM					
107.01	149.40	210.45	0.3111				

TIME = 52.00

FLAT	CLCX	CONC	EFFICI	LIQID	VAPOR	TEMP	HEAT FLOW
1	0.0883	0.0883	1.1553	83.16	111.11	14.73	0.00000
2	0.0905	0.0905	1.1553	83.16	111.11	14.73	0.00000
3	0.0927	0.0927	1.1553	83.16	111.11	14.73	0.00000
4	0.0949	0.0949	1.1553	83.16	111.11	14.73	0.00000
5	0.0971	0.0971	1.1553	83.16	111.11	14.73	0.00000
6	0.0993	0.0993	1.1553	83.16	111.11	14.73	0.00000
7	0.1015	0.1015	1.1553	83.16	111.11	14.73	0.00000
8	0.1037	0.1037	1.1553	83.16	111.11	14.73	0.00000
9	0.1059	0.1059	1.1553	83.16	111.11	14.73	0.00000
10	0.0884	0.0884	1.1553	83.16	111.11	14.73	0.00000
REFLUX	ERRR	FEED	FEED CONC.				
136.65	-0.3311	149.40	0.3111				
STEAM	TEMPERATURE						
FLW	REFLUX	STEAM					
107.01	149.40	209.55	0.3111				

TABLE U-5 CPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0934	0.4855	1.1436	81.53	135.83	14.77	0.048998
2	0.3418	0.7162	0.8693	217.25	157.70	3.67	0.113892
3	0.5089	0.8060	0.8204	239.03	169.65	3.53	0.065680
4	0.5805	0.8444	1.0658	250.92	176.76	3.47	0.027867
5	0.7533	0.9006	0.9365	108.61	187.54	3.30	0.030694
6	0.8506	0.9343	0.7905	119.35	194.48	3.20	0.025619
7	0.9059	0.9645	1.1590	126.27	201.13	3.15	0.018061
8	0.9535	0.9749	0.5166	132.90	203.04	3.10	0.014692
9	0.9696	0.9848	0.7002	134.79	204.87	3.08	0.008332
10	0.9847	0.0000	0.0000	136.62	0.00	2.83	0.007112

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4276	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	192.41	208.86	6352.27	104499.22
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0967	0.4962	1.1492	81.11	136.68	14.76	0.033026
2	0.3497	0.7217	0.8662	217.72	158.48	3.67	0.077415
3	0.5135	0.8082	0.8221	239.46	170.10	3.53	0.045400
4	0.5824	0.8454	1.0701	251.04	177.07	3.47	0.018549
5	0.7553	0.9014	0.9380	108.59	187.87	3.30	0.020345
6	0.8523	0.9350	0.7881	119.37	194.80	3.20	0.016287
7	0.9071	0.9651	1.1665	126.29	201.47	3.15	0.011488
8	0.9545	0.9752	0.5099	132.94	203.35	3.10	0.008980
9	0.9701	0.9850	0.6925	134.81	205.16	3.08	0.005843
10	0.9849	0.0000	0.0000	136.62	0.00	2.83	0.003656

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4532	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.99	208.44	6352.27	104516.64
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TABLE U-2, CONTINUED - STEAM LOOP - 2

TIME = 30.00

PLATE	CLCXX	CONV EFFICI	LIQUID	VAPOR	HEAT LOAD	DERIVATIVE
1	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
2	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
3	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
4	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
5	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
6	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
7	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
8	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
9	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
10	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
REFLUX	136.65	-0.4537	149.40	0.5117		
STEAM		TEMPERATURE		COEFFICIENT	HEAT LOAD	
FLOW		REFLUX				
107.61	192.41	208.88	832.24	1042.04		

TIME = 35.00

PLATE	CLCXX	CONV EFFICI	LIQUID	VAPOR	HEAT LOAD	DERIVATIVE
1	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
2	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
3	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
4	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
5	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
6	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
7	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
8	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
9	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
10	0.0000	0.0000	1.1438	1.1438	14.77	0.00000
REFLUX	136.65	-0.4537	149.40	0.5117		
STEAM		TEMPERATURE		COEFFICIENT	HEAT LOAD	
FLOW		REFLUX				
107.61	192.41	208.88	832.24	1042.04		

TABLE U-5 OPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 40.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0990	0.5035	1.1530	80.84	137.30	14.76	0.022334
2	0.3552	0.7255	0.8641	218.09	159.02	3.66	0.054002
3	0.5166	0.8097	0.8233	239.77	170.41	3.53	0.030457
4	0.5837	0.8460	1.0730	251.14	177.27	3.47	0.013163
5	0.7567	0.9020	0.9390	108.59	188.09	3.30	0.013554
6	0.8534	0.9354	0.7866	119.39	195.01	3.20	0.010783
7	0.9079	0.9655	1.1714	126.30	201.69	3.14	0.007428
8	0.9551	0.9755	0.5056	132.97	203.55	3.09	0.005506
9	0.9705	0.9851	0.6876	134.82	205.35	3.08	0.003803
10	0.9850	0.0000	0.0000	136.62	0.00	2.83	0.002300

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4668	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.70	208.15	6352.27	104528.46
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TIME = 45.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1006	0.5080	1.1557	80.64	137.69	14.75	0.016032
2	0.3587	0.7279	0.8627	218.30	159.38	3.66	0.031969
3	0.5187	0.8107	0.8241	239.96	170.64	3.52	0.018524
4	0.5846	0.8464	1.0750	251.20	177.43	3.46	0.008218
5	0.7577	0.9024	0.9396	108.58	188.26	3.30	0.008614
6	0.8541	0.9357	0.7855	119.40	195.17	3.20	0.006910
7	0.9084	0.9657	1.1745	126.31	201.85	3.14	0.004666
8	0.9554	0.9756	0.5029	132.98	203.70	3.09	0.003606
9	0.9707	0.9852	0.6845	134.83	205.49	3.08	0.002316
10	0.9851	0.0000	0.0000	136.62	0.00	2.83	0.001427

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4756	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.50	207.96	6352.27	104536.68
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TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT LOAD
1	0.0000	0.0000	1.1111	80.84	137.31	0.000000
2	0.0000	0.0000	1.1111	80.84	137.31	0.000000
3	0.0000	0.0000	1.1111	80.84	137.31	0.000000
4	0.0000	0.0000	1.1111	80.84	137.31	0.000000
5	0.0000	0.0000	1.1111	80.84	137.31	0.000000
6	0.0000	0.0000	1.1111	80.84	137.31	0.000000
7	0.0000	0.0000	1.1111	80.84	137.31	0.000000
8	0.0000	0.0000	1.1111	80.84	137.31	0.000000
9	0.0000	0.0000	1.1111	80.84	137.31	0.000000
10	0.0000	0.0000	1.1111	80.84	137.31	0.000000
REFLUX	0.0000	0.0000	1.1111	80.84	137.31	0.000000
FEED	0.0000	0.0000	1.1111	80.84	137.31	0.000000
TEMPERATURE	0.0000	0.0000	1.1111	80.84	137.31	0.000000
STEAM	0.0000	0.0000	1.1111	80.84	137.31	0.000000
FLOW	0.0000	0.0000	1.1111	80.84	137.31	0.000000
COEFFICIENT	0.0000	0.0000	1.1111	80.84	137.31	0.000000
HEAT LOAD	0.0000	0.0000	1.1111	80.84	137.31	0.000000

TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT LOAD
1	0.0000	0.0000	1.1111	80.84	137.31	0.000000
2	0.0000	0.0000	1.1111	80.84	137.31	0.000000
3	0.0000	0.0000	1.1111	80.84	137.31	0.000000
4	0.0000	0.0000	1.1111	80.84	137.31	0.000000
5	0.0000	0.0000	1.1111	80.84	137.31	0.000000
6	0.0000	0.0000	1.1111	80.84	137.31	0.000000
7	0.0000	0.0000	1.1111	80.84	137.31	0.000000
8	0.0000	0.0000	1.1111	80.84	137.31	0.000000
9	0.0000	0.0000	1.1111	80.84	137.31	0.000000
10	0.0000	0.0000	1.1111	80.84	137.31	0.000000
REFLUX	0.0000	0.0000	1.1111	80.84	137.31	0.000000
FEED	0.0000	0.0000	1.1111	80.84	137.31	0.000000
TEMPERATURE	0.0000	0.0000	1.1111	80.84	137.31	0.000000
STEAM	0.0000	0.0000	1.1111	80.84	137.31	0.000000
FLOW	0.0000	0.0000	1.1111	80.84	137.31	0.000000
COEFFICIENT	0.0000	0.0000	1.1111	80.84	137.31	0.000000
HEAT LOAD	0.0000	0.0000	1.1111	80.84	137.31	0.000000

TABLE U-5 OPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1017	0.5109	1.1575	80.52	137.95	14.75	0.010915
2	0.3608	0.7294	0.8619	218.44	159.60	3.66	0.020568
3	0.5200	0.8113	0.8245	240.08	170.77	3.52	0.013311
4	0.5851	0.8467	1.0762	251.23	177.52	3.46	0.004833
5	0.7582	0.9026	0.9400	108.58	188.35	3.30	0.005693
6	0.8546	0.9358	0.7849	119.41	195.26	3.20	0.004411
7	0.9087	0.9658	1.1765	126.32	201.94	3.14	0.003038
8	0.9557	0.9757	0.5012	132.99	203.79	3.09	0.002222
9	0.9708	0.9852	0.6825	134.84	205.57	3.08	0.001631
10	0.9852	0.0000	0.0000	136.62	0.00	2.83	0.000839

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4814	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.36	207.82	6352.27	104542.39
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TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1024	0.5128	1.1587	80.43	138.11	14.75	0.007129
2	0.3623	0.7304	0.8613	218.53	159.76	3.66	0.014807
3	0.5208	0.8117	0.8249	240.16	170.86	3.52	0.007366
4	0.5855	0.8469	1.0770	251.26	177.58	3.46	0.003799
5	0.7586	0.9028	0.9403	108.58	188.42	3.30	0.003507
6	0.8549	0.9359	0.7845	119.41	195.33	3.20	0.002848
7	0.9089	0.9659	1.1778	126.32	202.01	3.14	0.001920
8	0.9558	0.9758	0.5001	133.00	203.85	3.09	0.001409
9	0.9709	0.9852	0.6813	134.84	205.63	3.08	0.001033
10	0.9852	0.0000	0.0000	136.62	0.00	2.83	0.000532

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4849	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.27	207.72	6352.27	104546.21
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TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	DERIVATIVE
1	0.1017	0.2109	1.1212	131.22	14.12	0.0101
2	0.3601	0.4417	0.8819	129.44	14.12	0.0101
3	0.7117	0.8242	0.8242	120.17	14.12	0.0101
4	0.8447	1.0162	0.8447	117.22	14.12	0.0101
5	0.7282	0.9400	0.9400	117.22	14.12	0.0101
6	0.8246	0.7849	0.7849	112.41	14.12	0.0101
7	0.8246	1.1212	1.1212	120.17	14.12	0.0101
8	0.7282	0.9400	0.9400	117.22	14.12	0.0101
9	0.8246	0.8242	0.8242	120.17	14.12	0.0101
10	0.8246	0.8242	0.8242	120.17	14.12	0.0101
REFLUX	ERROR	FEED	FEED CONC.			
136.62	-0.0117	149.40	0.0117			
STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD			
FLW	REFLUX	STEAM				
107.61	191.36	207.82	6000.22	10441.22		

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	DERIVATIVE
1	0.1024	0.2125	1.1287	80.43	14.12	0.00129
2	0.3623	0.4304	0.4304	218.22	14.12	0.014807
3	0.7117	0.8117	0.8117	120.17	14.12	0.007366
4	0.8447	1.0162	1.0162	221.22	14.12	0.007309
5	0.7282	0.9400	0.9400	10.22	14.12	0.007309
6	0.8246	0.7849	0.7849	112.41	14.12	0.007309
7	0.8246	1.1212	1.1212	120.17	14.12	0.007309
8	0.7282	0.9400	0.9400	117.22	14.12	0.007309
9	0.8246	0.8242	0.8242	120.17	14.12	0.007309
10	0.8246	0.8242	0.8242	120.17	14.12	0.007309
REFLUX	ERROR	FEED	FEED CONC.			
136.62	-0.0464	149.40	0.0117			
STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD			
FLW	REFLUX	STEAM				
107.61	191.36	207.82	6000.22	10441.22		

TABLE U-5 OPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1029	0.5141	1.1596	80.38	138.23	14.75	0.004881
2	0.3632	0.7311	0.8609	218.60	159.85	3.66	0.008738
3	0.5214	0.8120	0.8251	240.22	170.92	3.52	0.006376
4	0.5857	0.8470	1.0775	251.27	177.62	3.46	0.001904
5	0.7589	0.9028	0.9405	108.58	188.46	3.30	0.002476
6	0.8551	0.9360	0.7842	119.42	195.37	3.20	0.001826
7	0.9090	0.9660	1.1786	126.32	202.05	3.14	0.001255
8	0.9559	0.9758	0.4994	133.00	203.89	3.09	0.000905
9	0.9710	0.9853	0.6805	134.84	205.67	3.08	0.000663
10	0.9853	0.0000	0.0000	136.62	0.00	2.83	0.000341

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4872	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.20	207.66	6352.27	104548.75
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1033	0.5149	1.1601	80.35	138.30	14.75	0.003115
2	0.3639	0.7316	0.8607	218.64	159.92	3.66	0.006967
3	0.5217	0.8121	0.8252	240.26	170.96	3.52	0.002751
4	0.5859	0.8471	1.0779	251.29	177.65	3.46	0.001889
5	0.7590	0.9029	0.9406	108.58	188.49	3.30	0.001442
6	0.8552	0.9361	0.7841	119.42	195.40	3.20	0.001209
7	0.9091	0.9660	1.1791	126.32	202.08	3.14	0.000794
8	0.9560	0.9758	0.4990	133.01	203.92	3.09	0.000577
9	0.9710	0.9853	0.6800	134.84	205.69	3.08	0.000424
10	0.9853	0.0000	0.0000	136.62	0.00	2.83	0.000218

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4886	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.16	207.62	6352.27	104550.46
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TABLE 1 - OPEN - STEP IN STEAM FLOW - 1000

TIME = 60.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT LOAD
1	0.1029	0.2141	1.1298	10.38	138.88	0.004881
2	0.3682	0.7311	1.1298	10.38	138.88	0.004881
3	0.2519	0.8121	1.1298	10.38	138.88	0.004881
4	0.2827	0.8471	1.0779	10.38	138.88	0.004881
5	0.2827	0.8471	1.0779	10.38	138.88	0.004881
6	0.2827	0.8471	1.0779	10.38	138.88	0.004881
7	0.2827	0.8471	1.0779	10.38	138.88	0.004881
8	0.2827	0.8471	1.0779	10.38	138.88	0.004881
9	0.2827	0.8471	1.0779	10.38	138.88	0.004881
10	0.2827	0.8471	1.0779	10.38	138.88	0.004881
REFLUX	ERROR	FEED	FEED CONC.			
136.62	-0.4872	149.41	0.2117			
STEAM FLOW	REFLECTER	TEMPERATURE	COEFFICIENT	HEAT LOAD		
107.61	191.20	207.60	0.2117	1000.00		

TIME = 60.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT LOAD
1	0.1029	0.2141	1.1298	10.38	138.88	0.004881
2	0.3682	0.7311	1.1298	10.38	138.88	0.004881
3	0.2519	0.8121	1.1298	10.38	138.88	0.004881
4	0.2827	0.8471	1.0779	10.38	138.88	0.004881
5	0.2827	0.8471	1.0779	10.38	138.88	0.004881
6	0.2827	0.8471	1.0779	10.38	138.88	0.004881
7	0.2827	0.8471	1.0779	10.38	138.88	0.004881
8	0.2827	0.8471	1.0779	10.38	138.88	0.004881
9	0.2827	0.8471	1.0779	10.38	138.88	0.004881
10	0.2827	0.8471	1.0779	10.38	138.88	0.004881
REFLUX	ERROR	FEED	FEED CONC.			
136.62	-0.4886	149.41	0.2117			
STEAM FLOW	REFLECTER	TEMPERATURE	COEFFICIENT	HEAT LOAD		
107.61	191.16	207.60	0.2117	1000.00		

TABLE U-5 OPEN LOOP - STEP IN STEAM FLOW - RUN 1

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1035	0.5155	1.1605	80.32	138.35	14.75	0.002219
2	0.3643	0.7319	0.8605	218.67	159.97	3.66	0.003479
3	0.5220	0.8122	0.8253	240.28	170.98	3.52	0.003367
4	0.5859	0.8471	1.0781	251.29	177.67	3.46	0.000619
5	0.7591	0.9030	0.9407	108.58	188.51	3.30	0.001142
6	0.8553	0.9361	0.7839	119.42	195.41	3.20	0.000774
7	0.9092	0.9661	1.1794	126.32	202.10	3.14	0.000538
8	0.9561	0.9759	0.4987	133.01	203.93	3.09	0.000379
9	0.9710	0.9853	0.6796	134.84	205.71	3.08	0.000278
10	0.9853	0.0000	0.0000	136.62	0.00	2.83	0.000141

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4895	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.14	207.59	6352.27	104551.57
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1036	0.5159	1.1607	80.31	138.38	14.75	0.001337
2	0.3646	0.7320	0.8604	218.69	160.00	3.66	0.003530
3	0.5221	0.8123	0.8254	240.30	171.00	3.52	0.000669
4	0.5860	0.8472	1.0782	251.30	177.68	3.46	0.001070
5	0.7592	0.9030	0.9407	108.58	188.52	3.30	0.000561
6	0.8553	0.9361	0.7839	119.42	195.43	3.20	0.000529
7	0.9092	0.9661	1.1797	126.33	202.11	3.14	0.000331
8	0.9561	0.9759	0.4985	133.01	203.94	3.09	0.000244
9	0.9710	0.9853	0.6794	134.84	205.72	3.08	0.000177
10	0.9853	0.0000	0.0000	136.62	0.00	2.83	0.000092

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4901	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.61	191.12	207.58	6352.27	104552.32
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TIME = 12.00

PLATE	CNCX	CNCX EFFICI	LIQUID	VAR	HUL - P	DERIVATIVE
1	0.010	0.010	1.160	13.38	14.75	0.00000
2	0.036	0.036	1.160	13.38	14.75	0.00000
3	0.052	0.052	1.160	13.38	14.75	0.00000
4	0.068	0.068	1.160	13.38	14.75	0.00000
5	0.084	0.084	1.160	13.38	14.75	0.00000
6	0.100	0.100	1.160	13.38	14.75	0.00000
7	0.116	0.116	1.160	13.38	14.75	0.00000
8	0.132	0.132	1.160	13.38	14.75	0.00000
9	0.148	0.148	1.160	13.38	14.75	0.00000
10	0.164	0.164	1.160	13.38	14.75	0.00000
REFLX	ERRR	FEED	FEED CONC.			
136.65	-0.4895	14.44	0.2117			
STEAM	TEMPERATURE					
FLW	RECILR	FEAT				
107.61	101.14	107.61	107.61			

TIME = 12.00

PLATE	CNCX	CNCX EFFICI	LIQUID	VAR	HUL - P	DERIVATIVE
1	0.010	0.010	1.160	13.38	14.75	0.00000
2	0.036	0.036	1.160	13.38	14.75	0.00000
3	0.052	0.052	1.160	13.38	14.75	0.00000
4	0.068	0.068	1.160	13.38	14.75	0.00000
5	0.084	0.084	1.160	13.38	14.75	0.00000
6	0.100	0.100	1.160	13.38	14.75	0.00000
7	0.116	0.116	1.160	13.38	14.75	0.00000
8	0.132	0.132	1.160	13.38	14.75	0.00000
9	0.148	0.148	1.160	13.38	14.75	0.00000
10	0.164	0.164	1.160	13.38	14.75	0.00000
REFLX	ERRR	FEED	FEED CONC.			
136.65	-0.4895	14.44	0.2117			
STEAM	TEMPERATURE					
FLW	RECILR	FEAT				
107.61	101.14	107.61	107.61			

TABLE U-6 OPEN LOOP - STEP IN STEAM FLOW - RUN 2

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1141	0.5253	1.1354	81.26	138.70	14.72	0.000006
2	0.3734	0.7308	0.8050	219.96	159.32	3.65	0.000008
3	0.5225	0.8179	0.9907	240.58	171.31	3.52	0.000004
4	0.5915	0.8478	1.0553	252.57	177.16	3.46	0.000001
5	0.7616	0.8933	0.6930	109.02	185.68	3.29	0.000002
6	0.8397	0.9361	1.0107	117.54	194.57	3.22	0.000000
7	0.9093	0.9622	0.9396	126.43	200.19	3.14	-0.000000
8	0.9500	0.9774	0.8127	132.05	203.30	3.10	-0.000000
9	0.9731	0.9858	0.6328	135.16	204.76	3.08	-0.000001
10	0.9858	0.0000	0.0000	136.62	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
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136.62	-0.4901	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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107.48	189.79	209.76	5222.91	104287.81
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TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0914	0.4796	1.1429	68.39	143.43	14.77	-0.268234
2	0.3349	0.6996	0.7918	212.40	164.65	3.68	-0.457654
3	0.4956	0.8043	0.9264	234.00	178.91	3.55	-0.318905
4	0.5781	0.8425	1.0470	248.52	186.16	3.47	-0.150045
5	0.7486	0.8889	0.7051	106.52	195.18	3.31	-0.139189
6	0.8302	0.9323	1.0080	115.68	204.57	3.23	-0.095838
7	0.9031	0.9590	0.9028	125.17	210.53	3.15	-0.066398
8	0.9456	0.9753	0.8080	131.20	214.07	3.10	-0.051695
9	0.9707	0.9849	0.6626	134.80	215.86	3.08	-0.032172
10	0.9852	0.0000	0.0000	136.62	0.00	2.83	-0.022862

REFLUX	ERROR	FEED	FEED CONC.
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136.62	0.0645	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	192.66	213.85	5222.91	110624.57
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TIME = 0.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	L	DERIVATIVE
1	0.1141	0.2523	1.1324	1.1387	14.75	-0.00000
2	0.3777	0.1303	0.8020	0.1247	14.75	-0.00000
3	0.2525	0.2130	0.2907	0.0528	14.75	-0.00004
4	0.2291	0.1777	0.1777	0.2525	14.75	-0.00001
5	0.2716	0.0827	0.0930	0.1827	14.75	-0.00005
6	0.1177	0.2361	1.0107	0.1477	14.75	-0.00000
7	0.0647	0.1777	0.0930	0.2525	14.75	-0.00000
8	0.2200	0.2774	0.8127	0.0370	14.75	-0.00000
9	0.1177	0.0827	0.0930	0.1827	14.75	-0.00001
10	0.2528	0.0000	0.0000	0.0000	14.75	-0.00001
REFLUX	ERRCR	FEED	FEED CONC.			
136.65	-0.4801	149.40	0.2114			
STEAM	REBILTR	TEMPERATURE	COEFFICIENT	HEAT LOAD		
107.44	149.79	149.79	2525.21	104.1.81		

TIME = 2.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	L	DERIVATIVE
1	0.0214	0.4706	1.1429	0.0339	14.75	-0.208234
2	0.1177	0.1303	0.1247	0.1247	14.75	-0.427024
3	0.2525	0.2130	0.2907	0.0528	14.75	-0.3189
4	0.2291	0.1777	0.1777	0.2525	14.75	-0.150149
5	0.2716	0.0827	0.0930	0.1827	14.75	-0.131189
6	0.1177	0.2361	1.0080	0.1477	14.75	-0.092838
7	0.0647	0.1777	0.0930	0.2525	14.75	-0.064308
8	0.2200	0.2774	0.8080	0.0370	14.75	-0.021025
9	0.1177	0.0827	0.0930	0.1827	14.75	-0.0115
10	0.2528	0.0000	0.0000	0.0000	14.75	-0.028865
REFLUX	ERRCR	FEED	FEED CONC.			
136.65	0.0647	149.40	0.2114			
STEAM	REBILTR	TEMPERATURE	COEFFICIENT	HEAT LOAD		
114.00	149.79	149.79	2525.21	110.24.01		

TABLE U-6 OPEN LOOP - STEP IN STEAM FLOW - RUN 2

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0728	0.4389	1.1490	70.16	140.09	14.81	-0.179427
2	0.3036	0.6713	0.7810	210.64	161.08	3.70	-0.302160
3	0.4726	0.7914	0.8711	231.87	176.33	3.57	-0.236133
4	0.5670	0.8382	1.0401	247.34	184.77	3.48	-0.130374
5	0.7393	0.8856	0.7138	106.49	193.83	3.32	-0.092682
6	0.8239	0.9298	1.0062	115.65	203.23	3.23	-0.060238
7	0.8987	0.9566	0.8769	125.11	209.10	3.15	-0.040485
8	0.9420	0.9737	0.8041	131.03	212.71	3.11	-0.038983
9	0.9684	0.9841	0.6921	134.67	214.62	3.08	-0.018067
10	0.9843	0.0000	0.0000	136.62	0.00	2.83	-0.022188

REFLUX	ERROR	FEED	FEED CONC.
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136.62	0.1507	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	195.14	216.30	5222.91	110514.07
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TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0615	0.4061	1.1527	71.30	137.60	14.84	-0.103526
2	0.2809	0.6459	0.7732	209.13	158.07	3.72	-0.225021
3	0.4534	0.7788	0.8253	229.76	174.04	3.58	-0.218331
4	0.5568	0.8342	1.0338	245.92	183.66	3.49	-0.120391
5	0.7321	0.8831	0.7205	106.25	192.87	3.32	-0.081220
6	0.8195	0.9280	1.0050	115.54	202.33	3.24	-0.047759
7	0.8957	0.9551	0.8595	125.05	208.16	3.16	-0.030864
8	0.9395	0.9726	0.8013	130.91	211.81	3.11	-0.025148
9	0.9668	0.9835	0.7121	134.59	213.82	3.08	-0.018181
10	0.9837	0.0000	0.0000	136.62	0.00	2.83	-0.010966

REFLUX	ERROR	FEED	FEED CONC.
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136.62	0.2122	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	196.78	217.92	5222.91	110441.22
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TIME = 10.

PLATE	COND	COND EFFICI	LIQUID	VAPOR	LD-5 DERIVATIVE
1	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
2	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
3	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
4	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
5	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
6	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
7	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
8	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
9	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
10	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
REFLUX	ERROR	FEED	FEED CONC.		
136.62	0.1251	14.81	0.1251		
STEAM	TEMPERATURE	COEFFICIENT	HEAT FLOW		
114.20	14.81	222.21	11014.01		

TIME = 11.

PLATE	COND	COND EFFICI	LIQUID	VAPOR	LD-5 DERIVATIVE
1	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
2	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
3	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
4	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
5	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
6	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
7	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
8	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
9	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
10	0.0019	0.4001	1.1251	1.1251	14.81 - 0.17991
REFLUX	ERROR	FEED	FEED CONC.		
136.62	0.1251	14.81	0.1251		
STEAM	TEMPERATURE	COEFFICIENT	HEAT FLOW		
114.20	14.81	222.21	11014.01		

TABLE U-6 OPEN LCOP - STEP IN STEAM FLOW - RUN 2

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0544	0.3845	1.1551	72.12	136.03	14.85	-0.069312
2	0.2651	0.6260	0.7677	208.30	155.69	3.73	-0.161199
3	0.4376	0.7676	0.7875	228.07	172.17	3.60	-0.155336
4	0.5476	0.8307	1.0282	244.70	182.75	3.50	-0.096784
5	0.7258	0.8808	0.7264	105.96	192.09	3.33	-0.068781
6	0.8158	0.9265	1.0040	115.37	201.64	3.24	-0.040511
7	0.8934	0.9538	0.8458	124.96	207.45	3.16	-0.024875
8	0.9375	0.9717	0.7993	130.80	211.14	3.11	-0.021213
9	0.9656	0.9831	0.7277	134.52	213.23	3.08	-0.011958
10	0.9833	0.0000	0.0000	136.62	0.00	2.83	-0.010136

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	0.2581	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	197.81	218.94	5222.91	110395.33
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0496	0.3697	1.1567	72.74	134.99	14.86	-0.047941
2	0.2541	0.6119	0.7639	207.82	154.03	3.74	-0.102827
3	0.4264	0.7591	0.7609	226.93	170.85	3.61	-0.121435
4	0.5406	0.8279	1.0238	243.86	182.07	3.50	-0.075244
5	0.7207	0.8790	0.7312	105.75	191.51	3.33	-0.055226
6	0.8128	0.9253	1.0031	115.24	201.12	3.24	-0.032628
7	0.8916	0.9527	0.8347	124.88	206.91	3.16	-0.020369
8	0.9360	0.9710	0.7976	130.70	210.65	3.12	-0.016578
9	0.9646	0.9828	0.7398	134.46	212.80	3.08	-0.011762
10	0.9829	0.0000	0.0000	136.62	0.00	2.83	-0.006324

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	0.2925	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	198.51	219.64	5222.91	110364.11
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TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQID	VAPOR	LI-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
2	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
3	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
4	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
5	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
6	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
7	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
8	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
9	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
10	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
REFLUX	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
FEED	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
FEED CONC.	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
STEAM	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
RECYCLER	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
HEAT LOAD	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111

TIME = 52.00

PLATE	CONCX	CONCV	EFFICI	LIQID	VAPOR	LI-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
2	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
3	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
4	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
5	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
6	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
7	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
8	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
9	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
10	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
REFLUX	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
FEED	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
FEED CONC.	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
STEAM	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
RECYCLER	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111
HEAT LOAD	0.0000	0.0000	0.0000	136.65	0.00	2.83	-0.0111

TABLE U-6 CPEN LOOP - STEP IN STEAM FLOW - RUN 2

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0464	C.3598	1.1577	73.22	134.30	14.87	-0.031183
2	C.2469	0.6012	C.7615	207.58	152.79	3.74	-0.074545
3	C.4180	C.7522	C.7407	226.12	169.79	3.61	-0.078334
4	C.5351	0.8254	1.0204	243.19	181.48	3.51	-0.057412
5	C.7163	0.8775	C.7352	105.53	191.02	3.34	-0.049436
6	C.8103	0.9243	1.0024	115.12	200.68	3.25	-0.028380
7	C.8900	0.9519	0.8256	124.82	206.47	3.16	-0.017031
8	0.9347	0.9704	C.7962	130.62	210.24	3.12	-0.014004
9	0.9638	C.9826	C.7500	134.41	212.44	3.09	-0.008598
10	0.9826	0.0000	C.0000	136.62	0.00	2.83	-0.006157

REFLUX	ERROR	FEED	FEED CONC.
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136.62	C.3206	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	198.98	220.10	5222.91	110343.18
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0442	0.3532	1.1585	73.60	133.84	14.87	-0.020767
2	C.2421	0.5940	C.7598	207.48	151.96	3.75	-0.048545
3	C.4123	C.7474	C.7270	225.63	169.06	3.62	-0.054601
4	0.5311	0.8235	1.0180	242.78	181.02	3.51	-0.040694
5	C.7126	0.8762	C.7386	105.38	190.63	3.34	-0.038206
6	C.8081	0.9235	1.0018	115.02	200.33	3.25	-0.022759
7	0.8887	0.9511	0.8179	124.75	206.11	3.16	-0.014160
8	0.9336	0.9699	C.7950	130.54	209.91	3.12	-0.011916
9	0.9632	0.9823	C.7584	134.36	212.16	3.09	-0.007411
10	0.9824	0.0000	C.0000	136.62	0.00	2.83	-0.005040

REFLUX	ERROR	FEED	FEED CONC.
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136.62	C.3434	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.29	220.41	5222.91	110329.34
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TABLE 1 - STEP IN STEAM FL

TIME = 30.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HOT - UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLECTOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 5.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HOT - UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLECTOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FLUX	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
HEAT LOSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-6 CPEN LCOP - STEP IN STEAM FLOW - RUN 2

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0414	0.3433	1.1594	74.25	133.17	14.88	-0.004377
2	0.2249	0.5833	C.7573	207.43	150.75	3.75	-0.017936
3	C.4039	0.7400	C.7069	225.02	167.96	3.62	-0.018301
4	0.5250	0.8205	1.0142	242.24	180.32	3.52	-0.015334
5	C.7065	0.8741	C.7443	105.22	190.00	3.35	-0.014700
6	C.8044	0.9220	1.0008	114.92	199.76	3.25	-0.009295
7	C.8863	0.9498	C.8036	124.68	205.49	3.17	-0.005915
8	C.9315	0.9690	C.7928	130.42	209.34	3.12	-0.005278
9	C.9618	0.9819	0.7754	134.28	211.68	3.09	-0.003437
10	C.9819	0.0000	C.0000	136.62	0.00	2.83	-0.002384

REFLUX	ERROR	FEED	FEED CONC.
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136.62	C.3892	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.69	220.81	5222.91	110311.35
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TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	C.0411	0.3417	1.1595	74.37	133.07	14.88	-0.003021
2	0.2238	0.5815	C.7569	207.44	150.55	3.75	-0.006130
3	C.4025	0.7388	C.7037	224.93	167.78	3.63	-0.019499
4	0.5240	0.8200	1.0135	242.17	180.20	3.52	-0.007012
5	C.7055	0.8737	C.7453	105.20	189.89	3.35	-0.010799
6	C.8037	0.9217	1.0006	114.90	199.66	3.25	-0.006523
7	C.8859	0.9495	C.8011	124.67	205.38	3.17	-0.004275
8	C.9311	0.9688	C.7924	130.40	209.24	3.12	-0.003850
9	0.9616	0.9818	C.7785	134.26	211.59	3.09	-0.002517
10	0.9819	0.0000	C.0000	136.62	0.00	2.83	-0.001772

REFLUX	ERROR	FEED	FEED CONC.
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136.62	C.3976	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.73	220.85	5222.91	110309.41
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TABLE 1-6: CEN FOR - WITH STEAM FLOW - ON 2

TIME = 22.00

PLATE	CONC	CONC EFFICI	LIQUID	WAPOR	L - H DERIVATIVE
10	0.9819	0.0000	0.0000	0.0000	0.000000
9	0.9819	0.9819	0.9819	0.9819	0.000000
8	0.9819	0.9819	0.9819	0.9819	0.000000
7	0.9819	0.9819	0.9819	0.9819	0.000000
6	0.9819	0.9819	0.9819	0.9819	0.000000
5	0.9819	0.9819	0.9819	0.9819	0.000000
4	0.9819	0.9819	0.9819	0.9819	0.000000
3	0.9819	0.9819	0.9819	0.9819	0.000000
2	0.9819	0.9819	0.9819	0.9819	0.000000
1	0.9819	0.9819	0.9819	0.9819	0.000000
REFLUX	0.9819	0.9819	0.9819	0.9819	0.000000
FEED	0.9819	0.9819	0.9819	0.9819	0.000000
TEMPERATURE	0.9819	0.9819	0.9819	0.9819	0.000000
COEFFICIENT	0.9819	0.9819	0.9819	0.9819	0.000000
STEAM FLOW	0.9819	0.9819	0.9819	0.9819	0.000000

TIME = 22.00

PLATE	CONC	CONC EFFICI	LIQUID	WAPOR	L - H DERIVATIVE
10	0.9819	0.0000	0.0000	0.0000	0.000000
9	0.9819	0.9819	0.9819	0.9819	0.000000
8	0.9819	0.9819	0.9819	0.9819	0.000000
7	0.9819	0.9819	0.9819	0.9819	0.000000
6	0.9819	0.9819	0.9819	0.9819	0.000000
5	0.9819	0.9819	0.9819	0.9819	0.000000
4	0.9819	0.9819	0.9819	0.9819	0.000000
3	0.9819	0.9819	0.9819	0.9819	0.000000
2	0.9819	0.9819	0.9819	0.9819	0.000000
1	0.9819	0.9819	0.9819	0.9819	0.000000
REFLUX	0.9819	0.9819	0.9819	0.9819	0.000000
FEED	0.9819	0.9819	0.9819	0.9819	0.000000
TEMPERATURE	0.9819	0.9819	0.9819	0.9819	0.000000
COEFFICIENT	0.9819	0.9819	0.9819	0.9819	0.000000
STEAM FLOW	0.9819	0.9819	0.9819	0.9819	0.000000

TABLE U-6 CPEN LOOP - STEP IN STEAM FLOW - RUN 2

TIME = 60.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0410	0.3407	1.1595	74.44	133.00	14.88	-0.002051
2	0.2230	0.5804	0.7567	207.45	150.42	3.75	-0.002051
3	0.4016	0.7380	0.7015	224.88	167.66	3.63	-0.015540
4	0.5233	0.8196	1.0131	242.12	180.13	3.52	-0.003524
5	0.7048	0.8735	0.7460	105.19	189.82	3.35	-0.007579
6	0.8032	0.9216	1.0004	114.89	199.59	3.25	-0.004516
7	0.8856	0.9494	0.7992	124.67	205.31	3.17	-0.003040
8	0.9309	0.9687	0.7921	130.39	209.17	3.12	-0.002796
9	0.9614	0.9818	0.7808	134.25	211.53	3.09	-0.001861
10	0.9818	0.0000	0.0000	136.62	0.00	2.83	-0.001229

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	0.4039	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.76	220.88	5222.91	110308.15
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TIME = 65.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0408	0.3400	1.1596	74.50	132.96	14.88	-0.001411
2	0.2225	0.5797	0.7565	207.46	150.34	3.75	0.001261
3	0.4010	0.7375	0.7000	224.85	167.58	3.63	-0.013490
4	0.5228	0.8194	1.0128	242.09	180.07	3.52	-0.000777
5	0.7043	0.8733	0.7464	105.19	189.77	3.35	-0.005307
6	0.8029	0.9214	1.0004	114.89	199.54	3.25	-0.003035
7	0.8854	0.9492	0.7980	124.67	205.26	3.17	-0.002117
8	0.9307	0.9686	0.7918	130.38	209.12	3.12	-0.001959
9	0.9613	0.9817	0.7825	134.24	211.49	3.09	-0.001296
10	0.9818	0.0000	0.0000	136.62	0.00	2.83	-0.000901

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	0.4084	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.78	220.90	5222.91	110307.30
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TIME = 00.00

TABLE U-6 OPEN LCOP - STEP IN STEAM FLOW - RUN 2

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0407	C.3396	1.1596	74.53	132.93	14.88	-0.000926
2	C.2322	C.5792	C.7564	207.46	150.29	3.75	0.000667
3	C.4006	C.7371	0.6991	224.83	167.53	3.63	-0.008674
4	C.5225	C.8192	1.0126	242.07	180.04	3.52	-0.000641
5	C.7039	0.8732	C.7468	105.19	189.74	3.35	-0.003544
6	C.8027	C.9213	1.0003	114.89	199.52	3.25	-0.002066
7	C.8852	0.9491	C.7971	124.67	205.22	3.17	-0.001459
8	C.9305	0.9685	C.7917	130.37	209.09	3.12	-0.001363
9	0.9612	0.9817	C.7836	134.24	211.46	3.09	-0.000763
10	0.9817	C.0000	C.0000	136.62	0.00	2.83	-0.000867

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	C.4117	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.79	220.91	5222.91	110306.74
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0407	0.3393	1.1596	74.56	132.91	14.88	-0.000676
2	C.2319	C.5788	C.7563	207.47	150.25	3.75	0.003694
3	C.4003	C.7369	0.6985	224.82	167.50	3.63	-0.009651
4	C.5223	C.8191	1.0125	242.06	180.02	3.52	0.001565
5	C.7037	0.8731	C.7470	105.19	189.72	3.35	-0.002564
6	C.8026	0.9213	1.0003	114.89	199.49	3.25	-0.001292
7	0.8851	0.9491	C.7965	124.67	205.20	3.17	-0.000966
8	C.9304	0.9685	C.7916	130.37	209.06	3.12	-0.000918
9	0.9611	0.9817	C.7845	134.24	211.44	3.09	-0.000620
10	C.9817	C.0000	C.0000	136.62	0.00	2.83	-0.000426

REFLUX	ERRCR	FEED	FEED CONC.
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136.62	C.4139	149.40	0.5117
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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114.20	199.80	220.92	5222.91	110306.41
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TABLE U- OPEN LOOP - STEP IN STEAM FLOW - RU

TIME = 15.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	LI - P DERIVATIVE
10	0.9817	0.0000	136.85	0.00	-0.00883
9	0.9815	0.7836	134.54	111.44	-0.001303
8	0.9805	0.7814	130.37	110.37	-0.001303
7	0.9821	0.7821	124.89	109.49	-0.000988
6	0.9826	0.9213	114.89	109.49	-0.000988
5	0.9837	0.7471	102.19	107.19	-0.000988
4	0.9823	0.6191	94.50	107.19	-0.000988
3	0.9803	0.7882	84.82	107.20	-0.000988
2	0.9812	0.7577	74.83	107.25	-0.000988
1	0.9847	0.3303	74.86	107.31	-0.000988
REFLUX	136.65	0.4114	107.31	0.2114	
FEED				FEED CONC.	
STEAM		TEMPERATURE		COEFFICIENT	HEAT LOAD
REC		REC			
114.50	107.30	550.91	555.91	110306.14	

TIME = 15.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	LI - P DERIVATIVE
10	0.9817	0.0000	136.85	0.00	-0.00451
9	0.9815	0.7836	134.54	111.44	-0.001303
8	0.9805	0.7814	130.37	110.37	-0.001303
7	0.9821	0.7821	124.89	109.49	-0.000988
6	0.9826	0.9213	114.89	109.49	-0.000988
5	0.9837	0.7471	102.19	107.19	-0.000988
4	0.9823	0.6191	94.50	107.19	-0.000988
3	0.9803	0.7882	84.82	107.20	-0.000988
2	0.9812	0.7577	74.83	107.25	-0.000988
1	0.9847	0.3303	74.86	107.31	-0.000988
REFLUX	136.65	0.4114	107.31	0.2114	
FEED				FEED CONC.	
STEAM		TEMPERATURE		COEFFICIENT	HEAT LOAD
REC		REC			
114.50	107.30	550.91	555.91	110306.14	

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0019	0.0717	1.2667	79.23	119.86	14.95	0.000002
2	C.0439	0.1429	C.6707	199.09	123.03	3.87	0.000001
3	C.0877	0.4443	1.0976	202.26	141.16	3.84	0.000007
4	C.2852	C.6682	C.8176	220.38	160.44	3.72	0.000007
5	C.4303	0.7640	C.8645	89.37	171.83	3.60	-0.000001
6	C.6207	0.8447	0.8359	100.76	184.81	3.43	0.000003
7	0.7680	0.9024	0.8550	113.73	195.48	3.29	-0.000002
8	C.8653	0.9398	C.7938	124.41	202.62	3.19	-0.000001
9	0.9249	0.9673	0.8841	131.54	207.82	3.13	-0.000001
10	C.9673	0.0000	C.0000	136.75	0.00	2.84	-0.000001

REFLUX ERROR FEED FEED CONC.

136.75 0.4139 150.30 0.4584

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

117.66 206.74 221.29 7800.04 113494.82

TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	C.0031	0.1148	1.2623	81.39	122.38	14.95	0.032006
2	C.0726	0.2330	C.7115	203.71	128.47	3.85	0.431920
3	0.1542	0.5430	1.0033	209.57	149.17	3.80	0.884233
4	C.3772	0.7416	C.8632	229.71	170.72	3.65	0.800454
5	C.5063	0.8027	C.8767	100.31	179.25	3.54	0.911831
6	C.6561	0.8616	C.8724	108.01	189.18	3.40	0.631958
7	C.7817	0.9071	0.8319	117.33	197.63	3.27	0.356853
8	0.8682	0.9410	C.7906	125.43	204.07	3.19	0.114104
9	0.9254	0.9676	C.8882	131.76	209.09	3.13	0.034601
10	0.9673	0.0000	C.0000	136.75	0.00	2.84	0.017031

REFLUX ERROR FEED FEED CONC.

136.75 -0.0057 150.30 0.5599

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBCILER STEAM

117.66 206.45 221.00 7800.04 113514.55

TABLE - 7, OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT - Q	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	136.75	0.4114	120.30	0.4884			
FEED							
ERROR							
STEAM							
RECWR							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT - Q	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	136.75	0.4114	120.30	0.4884			
FEED							
ERROR							
STEAM							
RECWR							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TABLE U-7 CPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0062	0.1655	1.2514	79.42	125.49	14.95	0.036217
2	0.1064	0.3430	0.7596	204.84	135.58	3.83	0.368590
3	0.2279	0.6167	0.8988	214.71	157.13	3.76	0.867910
4	0.4347	0.7725	0.8916	235.69	175.62	3.60	0.602447
5	0.5708	0.8311	0.8871	103.35	184.84	3.48	0.683473
6	0.7055	0.8825	0.9232	111.95	194.12	3.35	0.516662
7	0.8122	0.9177	0.7805	120.71	200.75	3.24	0.345732
8	0.8804	0.9462	0.7771	126.98	206.16	3.17	0.159563
9	0.9301	0.9703	0.9288	132.23	210.76	3.12	0.068194
10	0.9694	0.0000	0.0000	136.75	0.00	2.84	0.071130

REFLUX ERROR FEED FEED CONC.

136.75 -0.2083 150.30 0.5599

STEAM TEMPERATURE
FLCW REBCILER STEAM COEFFICIENT HEAT LOAD

117.66 205.74 220.30 7800.04 113562.16

TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0092	0.2113	1.2408	76.52	128.34	14.94	0.034721
2	0.1384	0.4338	0.8050	204.79	141.95	3.81	0.353744
3	0.2939	0.6654	0.8053	218.20	162.89	3.71	0.755810
4	0.4760	0.7931	0.9121	238.60	179.66	3.56	0.409646
5	0.6189	0.8493	0.8948	104.71	189.15	3.43	0.475716
6	0.7414	0.8972	0.9601	113.73	198.26	3.31	0.359869
7	0.8366	0.9268	0.7394	122.49	203.94	3.22	0.248497
8	0.8927	0.9514	0.7634	127.91	208.68	3.16	0.136381
9	0.9360	0.9736	0.9801	132.51	212.99	3.12	0.069718
10	0.9725	0.0000	0.0000	136.75	0.00	2.84	0.075920

REFLUX ERROR FEED FEED CONC.

136.75 -0.5234 150.30 0.5599

STEAM TEMPERATURE
FLCW REBCILER STEAM COEFFICIENT HEAT LOAD

117.66 205.08 219.65 7800.04 113606.33

TABLE U-7: OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 10.00

PLATE	CCOX	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9994	0.0000	0.0000	136.75	0.00	0.0000
9	0.9991	0.0009	0.0009	136.75	0.00	0.0000
8	0.9984	0.0016	0.0016	136.75	0.00	0.0000
7	0.9975	0.0025	0.0025	136.75	0.00	0.0000
6	0.9964	0.0036	0.0036	136.75	0.00	0.0000
5	0.9951	0.0049	0.0049	136.75	0.00	0.0000
4	0.9936	0.0064	0.0064	136.75	0.00	0.0000
3	0.9919	0.0081	0.0081	136.75	0.00	0.0000
2	0.9899	0.0101	0.0101	136.75	0.00	0.0000
1	0.9876	0.0124	0.0124	136.75	0.00	0.0000
REFLX	-0.5083	150.30	0.5583			
FEED						
TEMPERATURE						
STEAM						
RECIRC						
COEFFICIENT						
HEAT LOAD						
117.66	505.74	550.30	1800.04	113585.16		

TIME = 12.00

PLATE	CCOX	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9992	0.0000	0.0000	136.75	0.00	0.0000
9	0.9989	0.0001	0.0001	136.75	0.00	0.0000
8	0.9984	0.0006	0.0006	136.75	0.00	0.0000
7	0.9977	0.0013	0.0013	136.75	0.00	0.0000
6	0.9968	0.0022	0.0022	136.75	0.00	0.0000
5	0.9957	0.0033	0.0033	136.75	0.00	0.0000
4	0.9944	0.0046	0.0046	136.75	0.00	0.0000
3	0.9929	0.0061	0.0061	136.75	0.00	0.0000
2	0.9912	0.0078	0.0078	136.75	0.00	0.0000
1	0.9893	0.0097	0.0097	136.75	0.00	0.0000
REFLX	-0.5234	150.30	0.5534			
FEED						
TEMPERATURE						
STEAM						
RECIRC						
COEFFICIENT						
HEAT LOAD						
117.66	505.08	549.04	1800.04	113585.16		

TABLE U-7 CPEN LCOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0141	0.2409	1.2231	74.06	130.28	14.93	0.073899
2	0.1642	0.4974	0.8417	204.19	147.04	3.80	0.260439
3	C.3454	0.6961	C.7323	220.78	166.80	3.67	0.522853
4	0.5039	0.8056	C.9259	240.14	182.32	3.54	0.250205
5	0.6504	0.8615	0.8999	105.13	192.20	3.40	0.291398
6	C.7661	0.9073	C.9855	114.72	201.27	3.29	0.238014
7	0.8541	0.9336	C.7098	123.55	206.40	3.20	0.173386
8	0.9028	0.9557	C.7523	128.51	210.70	3.15	0.104228
9	0.9413	0.9763	1.0268	132.69	214.82	3.11	0.057325
10	0.9755	0.0000	C.0000	136.75	0.00	2.84	0.064366

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-0.8185	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	204.11	218.69	7800.04	113671.49
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0203	0.2644	1.2013	71.97	131.94	14.92	0.068999
2	C.1834	C.5405	0.8690	203.78	151.07	3.79	0.187575
3	0.3808	0.7152	C.6820	222.78	169.70	3.64	0.339866
4	0.5212	0.8132	C.9345	241.14	184.21	3.52	0.172396
5	0.6700	0.8688	C.9030	105.19	194.30	3.38	0.187413
6	C.7819	0.9137	1.0017	115.10	203.41	3.27	0.148429
7	0.8658	0.9382	C.6900	124.07	208.28	3.19	0.110828
8	C.9101	0.9588	C.7443	128.82	212.33	3.14	0.070381
9	0.9454	0.9784	1.0626	132.80	216.33	3.11	0.040869
10	0.9778	C.0000	C.0000	136.75	0.00	2.83	0.046846

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.0495	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	202.96	217.54	7800.04	113749.15
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TABLE 9-7. OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 20.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT-UP DERIVATIVE
1	0.0141	0.2409	1.2531	14.00	0.003899
2	0.0142	0.2424	1.2547	14.04	0.004439
3	0.0149	0.2481	1.2523	14.07	0.005283
4	0.0203	0.2800	0.9229	14.10	0.005020
5	0.0209	0.8612	0.8299	14.12	0.001399
6	0.07661	0.2073	1.2577	14.13	0.003801
7	0.08941	0.9336	0.1499	13.95	0.013388
8	0.0900	0.2507	1.1497	13.91	0.004228
9	0.0711	0.2101	1.1200	13.93	0.002322
10	0.0436	0.0000	1.1114	14.00	0.004866
REFLUX	ERROR	FEED	FEED CONC.		
136.72	-0.8182	150.30	0.2299		
STEAM FLOW	REFILLER	TEMPERATURE	COEFFICIENT	HEAT LOAD	
117.66	204.11	211.25	7800.04	113071.49	

TIME = 22.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT-UP DERIVATIVE
1	0.0141	0.2409	1.2531	14.00	0.003899
2	0.0142	0.2424	1.2547	14.04	0.004439
3	0.0149	0.2481	1.2523	14.07	0.005283
4	0.0203	0.2800	0.9229	14.10	0.005020
5	0.0209	0.8612	0.8299	14.12	0.001399
6	0.07661	0.2073	1.2577	14.13	0.003801
7	0.08941	0.9336	0.1499	13.95	0.013388
8	0.0900	0.2507	1.1497	13.91	0.004228
9	0.0711	0.2101	1.1200	13.93	0.002322
10	0.0436	0.0000	1.1114	14.00	0.004866
REFLUX	ERROR	FEED	FEED CONC.		
136.72	-1.0422	150.30	0.2299		
STEAM FLOW	REFILLER	TEMPERATURE	COEFFICIENT	HEAT LOAD	
117.66	202.36	212.24	7800.04	113071.49	

TABLE U-7 CPEN LCOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0254	0.2808	1.1830	70.60	133.16	14.91	0.055805
2	0.1965	0.5683	0.8876	203.65	153.91	3.78	0.142181
3	0.4039	0.7286	0.6492	224.31	171.77	3.62	0.216647
4	0.5331	0.8187	0.9404	241.98	185.56	3.51	0.117627
5	0.6831	0.8736	0.9052	105.36	195.71	3.37	0.132017
6	0.7920	0.9178	1.0122	115.39	204.81	3.26	0.101238
7	0.8733	0.9412	0.6773	124.39	209.51	3.18	0.073668
8	0.9149	0.9608	0.7389	129.01	213.42	3.14	0.047473
9	0.9482	0.9798	1.0872	132.87	217.33	3.10	0.028382
10	0.9794	0.0000	0.0000	136.75	0.00	2.83	0.031885

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.2154	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	202.14	216.73	7800.04	113804.14
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0294	0.2925	1.1686	69.46	134.03	14.90	0.041676
2	0.2059	0.5857	0.9009	203.41	156.02	3.77	0.095434
3	0.4189	0.7364	0.6280	225.34	173.14	3.61	0.143155
4	0.5405	0.8222	0.9441	242.33	186.56	3.50	0.066352
5	0.6919	0.8769	0.9066	105.39	196.81	3.36	0.080742
6	0.7989	0.9205	1.0192	115.56	205.90	3.26	0.065273
7	0.8783	0.9432	0.6688	124.59	210.49	3.18	0.048477
8	0.9181	0.9622	0.7353	129.13	214.30	3.13	0.031625
9	0.9501	0.9807	1.1041	132.91	218.16	3.10	0.018960
10	0.9805	0.0000	0.0000	136.75	0.00	2.83	0.020569

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.3207	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	201.49	216.08	7800.04	113847.74
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TIME = 32.00

PLATE	CONCX	EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
10	0.9194	0.0000	0.0000	0.0000	117.66	201.49	117.66
9	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
8	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
7	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
6	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
5	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
4	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
3	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
2	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
1	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
REFLUX	136.75	-1.5194	100.30	0.0000			
FEED							
FEED CONC.							

TIME = 32.00

PLATE	CONCX	EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
10	0.9194	0.0000	0.0000	0.0000	117.66	201.49	117.66
9	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
8	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
7	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
6	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
5	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
4	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
3	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
2	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
1	0.9444	0.0000	0.0000	0.0000	117.66	201.49	117.66
REFLUX	136.75	-1.5194	100.30	0.0000			
FEED							
FEED CONC.							

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 40.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0324	0.3004	1.1580	68.71	134.62	14.89	0.029758
2	0.2121	0.5972	0.9098	203.28	157.46	3.77	0.063168
3	0.4288	0.7411	0.6140	226.08	173.99	3.60	0.092075
4	0.5449	0.8243	0.9462	242.52	187.19	3.50	0.043488
5	0.6973	0.8789	0.9074	105.38	197.50	3.36	0.050404
6	0.8032	0.9222	1.0237	115.65	206.60	3.25	0.040688
7	0.8816	0.9445	0.6634	124.70	211.13	3.17	0.030521
8	0.9202	0.9631	0.7330	129.20	214.89	3.13	0.020256
9	0.9514	0.9813	1.1152	132.94	218.71	3.10	0.012339
10	0.9812	0.0000	0.0000	136.75	0.00	2.83	0.013305

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.3890	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	201.04	215.64	7800.04	113877.99
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TIME = 45.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0345	0.3055	1.1507	68.23	135.02	14.89	0.020437
2	0.2161	0.6047	0.9155	203.20	158.41	3.76	0.043091
3	0.4352	0.7442	0.6048	226.57	174.56	3.60	0.058251
4	0.5477	0.8257	0.9476	242.67	187.60	3.50	0.029231
5	0.7006	0.8802	0.9080	105.38	197.95	3.35	0.032173
6	0.8059	0.9233	1.0264	115.70	207.06	3.25	0.025589
7	0.8836	0.9454	0.6599	124.78	211.55	3.17	0.019990
8	0.9216	0.9637	0.7315	129.25	215.27	3.13	0.013222
9	0.9523	0.9817	1.1225	132.96	219.07	3.10	0.008056
10	0.9816	0.0000	0.0000	136.75	0.00	2.83	0.008529

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.4329	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.73	215.33	7800.04	113898.89
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TABLE U-7, OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 41.00

PLATE	CONC X	CONC V	EFFICI	LIQUID	VAPOR	HOLD-TIME	DERIVATIVE
1	0.0000	0.0000	1.0000	1.0000	1.0000	14.89	0.000000
2	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
3	0.0000	0.0000	1.0000	1.0000	1.0000	.	0.000000
4	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
5	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
6	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
7	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
8	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
9	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
10	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
REFLUX	136.75	-1.3333	121.33	0.2500	FEED CONC.		
STEAM FLOW	117.66	501.04	512.64	7800.04	COEFFICIENT	113877.77	HEAT LOAD

TIME = 42.00

PLATE	CONC X	CONC V	EFFICI	LIQUID	VAPOR	HOLD-TIME	DERIVATIVE
1	0.0000	0.0000	1.0000	1.0000	1.0000	14.89	0.000000
2	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
3	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
4	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
5	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
6	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
7	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
8	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
9	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
10	0.0000	0.0000	1.0000	1.0000	1.0000	3.77	0.000000
REFLUX	136.75	-1.4329	120.30	0.2500	FEED CONC.		
STEAM FLOW	117.66	500.73	511.33	7800.04	COEFFICIENT	113891.04	HEAT LOAD

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 50.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0359	0.3089	1.1456	67.89	135.28	14.89	0.013789
2	0.2187	0.6097	0.9192	203.14	159.06	3.76	0.022777
3	0.4394	0.7463	0.5990	226.90	174.95	3.59	0.042261
4	0.5496	0.8266	0.9486	242.76	187.89	3.50	0.016914
5	0.7028	0.8810	0.9083	105.38	198.26	3.35	0.020892
6	0.8076	0.9240	1.0282	115.73	207.38	3.25	0.016260
7	0.8850	0.9459	0.6576	124.83	211.84	3.17	0.012811
8	0.9225	0.9641	0.7305	129.28	215.54	3.13	0.008657
9	0.9528	0.9820	1.1272	132.97	219.32	3.10	0.004803
10	0.9819	0.0000	0.0000	136.75	0.00	2.83	0.005756

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.4611	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	FEED STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.52	215.12	7800.04	113913.07
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TIME = 55.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0368	0.3111	1.1423	67.68	135.45	14.89	0.009189
2	0.2204	0.6128	0.9216	203.12	159.47	3.76	0.013995
3	0.4421	0.7476	0.5951	227.12	175.21	3.59	0.028285
4	0.5508	0.8272	0.9492	242.84	188.07	3.50	0.011295
5	0.7042	0.8815	0.9086	105.39	198.45	3.35	0.013110
6	0.8087	0.9245	1.0293	115.75	207.57	3.25	0.010493
7	0.8859	0.9463	0.6562	124.87	212.02	3.17	0.008280
8	0.9231	0.9643	0.7298	129.30	215.70	3.13	0.005529
9	0.9531	0.9821	1.1302	132.98	219.47	3.10	0.003261
10	0.9821	0.0000	0.0000	136.75	0.00	2.83	0.003637

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.4795	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	FEED STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.37	214.98	7800.04	113922.58
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TABLE 1-7. OPEN LOOP - FEED IN FEED COMPOSITION - RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	DERIVATIVE
1	0.0359	0.0359	1.1456	1.1456	1.1456	0.013789
2	0.2187	0.6097	0.9195	0.9195	0.9195	0.022477
3	0.4394	0.9195	0.9195	0.9195	0.9195	0.044581
4	0.5496	0.9195	0.9195	0.9195	0.9195	0.066414
5	0.7058	0.8810	0.9195	0.9195	0.9195	0.088257
6	0.8810	0.8240	1.0373	1.0373	1.0373	0.110100
7	0.8820	0.8240	0.6276	1.0373	1.0373	0.131943
8	0.9255	0.8641	0.7305	1.0373	1.0373	0.153786
9	0.9255	1.1575	1.1575	1.1575	1.1575	0.175629
10	0.9255	0.0000	1.1575	1.1575	1.1575	0.197472
REFLX	ERROR	FEED	FEED	FEED	FEED	
136.75	-1.4611	150.30	0.5599			
STEAM	TEMPERATURE					
FLW	REFLX	STEAM				
117.66	500.55	515.15	780.04	11318.05		

TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	DERIVATIVE
1	0.0368	0.3111	1.1423	0.7.68	135.45	0.013789
2	0.2504	0.6152	0.9216	0.93.15	159.47	0.022477
3	0.4451	0.7476	0.9251	0.93.15	155.41	0.044581
4	0.5508	0.9252	0.9495	0.94.84	188.07	0.066414
5	0.7045	0.8815	0.9495	1.05.39	198.45	0.088257
6	0.8087	0.8245	1.0523	1.15.75	207.57	0.110100
7	0.8829	0.8643	0.6265	1.04.87	215.05	0.131943
8	0.9251	0.8643	0.7308	1.04.87	215.05	0.153786
9	0.9251	0.9851	1.1305	1.13.05	219.47	0.175629
10	0.9251	0.0000	1.13.05	1.13.05	219.47	0.197472
REFLX	ERROR	FEED	FEED	FEED	FEED	
136.75	-1.4795	150.30	0.5599			
STEAM	TEMPERATURE					
FLW	REFLX	STEAM				
117.66	500.37	514.9	780.04	11305.77		

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3125	1.1401	67.55	135.57	14.88	0.006146
2	0.2215	0.6148	0.9232	203.11	159.71	3.76	0.016861
3	0.4439	0.7485	0.5925	227.24	175.37	3.59	0.011723
4	0.5516	0.8275	0.9496	242.89	188.16	3.49	0.009674
5	0.7051	0.8818	0.9087	105.38	198.55	3.35	0.007651
6	0.8094	0.9248	1.0300	115.76	207.68	3.25	0.006579
7	0.8864	0.9465	0.6552	124.88	212.12	3.17	0.005197
8	0.9234	0.9645	0.7294	129.32	215.79	3.13	0.003534
9	0.9534	0.9822	1.1322	132.98	219.56	3.10	0.002236
10	0.9822	0.0000	0.0000	136.75	0.00	2.83	0.002254

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.4913	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.28	214.89	7800.04	113928.90
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0379	0.3135	1.1385	67.44	135.65	14.88	0.004336
2	0.2223	0.6161	0.9243	203.08	159.90	3.76	0.004173
3	0.4449	0.7490	0.5911	227.32	175.49	3.59	0.012537
4	0.5521	0.8277	0.9498	242.91	188.25	3.49	0.003148
5	0.7055	0.8820	0.9088	105.36	198.65	3.35	0.004545
6	0.8098	0.9250	1.0305	115.76	207.79	3.25	0.003586
7	0.8867	0.9466	0.6547	124.89	212.22	3.17	0.003026
8	0.9237	0.9646	0.7292	129.32	215.89	3.13	0.002045
9	0.9535	0.9823	1.1334	132.99	219.65	3.10	0.001226
10	0.9823	0.0000	0.0000	136.75	0.00	2.83	0.001408

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.4987	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.21	214.82	7800.04	113933.27
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TABLE U-7. OPEN LOOP - FEED COMPOSITION - Run 1

TIME = 60.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0375	0.3125	1.1401	0.1401	135.25	0.000144
2	0.0375	0.6148	0.2835	0.2835	159.11	0.018861
3	0.0375	0.7440	0.2511	0.2511	177.90	0.011538
4	0.0375	0.8277	0.2008	0.2008	188.10	0.004674
5	0.0375	0.8818	0.1302	0.1302	198.00	0.000521
6	0.0375	0.9248	0.0300	0.0300	212.10	0.000000
7	0.0375	0.9465	0.0000	0.0000	215.10	0.000000
8	0.0375	0.9645	0.0000	0.0000	217.10	0.000000
9	0.0375	0.9734	0.0000	0.0000	219.10	0.000000
10	0.0375	0.9800	0.0000	0.0000	220.10	0.000000

REFLX ERROR FEED FEED CONC.

136.75 -1.4213 12.30 0.2529

STEAM TEMPERATURE COEFFICIENT

REFLX STEAM

117.66 500.21 14.00 1801.00 11393.25

TIME = 2.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0375	0.3125	1.1385	0.1385	135.00	0.004881
2	0.0375	0.6161	0.2843	0.2843	159.00	0.004173
3	0.0375	0.7440	0.2511	0.2511	177.90	0.012331
4	0.0375	0.8277	0.2008	0.2008	188.10	0.003148
5	0.0375	0.8818	0.1302	0.1302	198.00	0.000000
6	0.0375	0.9248	0.0300	0.0300	212.10	0.000000
7	0.0375	0.9465	0.0000	0.0000	215.10	0.000000
8	0.0375	0.9645	0.0000	0.0000	217.10	0.000000
9	0.0375	0.9734	0.0000	0.0000	219.10	0.001250
10	0.0375	0.9800	0.0000	0.0000	220.10	0.001400

REFLX ERROR FEED FEED CONC.

136.75 -1.4981 12.30 0.2529

STEAM TEMPERATURE COEFFICIENT

REFLX STEAM

117.66 500.21 14.00 1801.00 11393.25

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0382	0.3142	1.1375	67.40	135.70	14.88	0.002815
2	0.2228	0.6168	0.9250	203.09	159.98	3.76	0.006957
3	0.4456	0.7493	0.5901	227.37	175.55	3.59	0.004572
4	0.5524	0.8278	0.9500	242.94	188.28	3.49	0.003790
5	0.7058	0.8821	0.9088	105.36	198.68	3.35	0.002788
6	0.8101	0.9251	1.0307	115.76	207.82	3.25	0.002384
7	0.8869	0.9467	0.6543	124.90	212.25	3.17	0.001885
8	0.9238	0.9646	0.7290	129.33	215.92	3.13	0.001292
9	0.9536	0.9823	1.1341	132.99	219.68	3.10	0.000827
10	0.9823	0.0000	0.0000	136.75	0.00	2.83	0.000840

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.5032	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.17	214.78	7800.04	113936.24
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0384	0.3146	1.1368	67.35	135.73	14.88	0.001902
2	0.2221	0.6173	0.9255	203.08	160.06	3.76	0.001551
3	0.4460	0.7495	0.5895	227.41	175.60	3.59	0.005562
4	0.5526	0.8279	0.9501	242.95	188.32	3.49	0.001132
5	0.7060	0.8821	0.9088	105.36	198.72	3.35	0.001786
6	0.8102	0.9251	1.0309	115.76	207.86	3.25	0.001336
7	0.8871	0.9468	0.6541	124.90	212.29	3.17	0.001108
8	0.9239	0.9647	0.7289	129.33	215.95	3.13	0.000748
9	0.9536	0.9823	1.1346	132.99	219.71	3.10	0.000439
10	0.9823	0.0000	0.0000	136.75	0.00	2.83	0.000522

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.5059	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.14	214.75	7800.04	113938.18
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TABLE 10-3. OPEN STEP - STEP IN FEED COMPOSITION - RUN 1

TIME = 10.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	DIFFERENTIAL
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	136.75	-1.503	150.30	0.2222	
FEED					
TEMPERATURE					
REBILIER					
STEAM					
FLOW	117.66	200.14	214.78	1800.04	11303.24
COEFFICIENT					
HEAT LOAD					

TIME = 15.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	DIFFERENTIAL
1	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	136.75	-1.503	150.30	0.2222	
FEED					
TEMPERATURE					
REBILIER					
STEAM					
FLOW	117.66	200.14	214.78	1800.04	11303.24
COEFFICIENT					
HEAT LOAD					

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 80.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0385	0.3149	1.1363	67.32	135.75	14.88	0.001289
2	0.2223	0.6177	0.9258	203.08	160.12	3.76	-0.002632
3	0.4463	0.7497	0.5892	227.43	175.64	3.59	0.006431
4	0.5527	0.8279	0.9501	242.95	188.34	3.49	-0.000791
5	0.7061	0.8822	0.9089	105.36	198.75	3.35	0.001110
6	0.8103	0.9252	1.0310	115.76	207.89	3.25	0.000628
7	0.8871	0.9468	0.6540	124.90	212.32	3.17	0.000619
8	0.9239	0.9647	0.7289	129.33	215.98	3.13	0.000394
9	0.9537	0.9824	1.1348	132.99	219.74	3.10	0.000186
10	0.9824	0.0000	0.0000	136.75	0.00	2.83	0.000323

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.5076	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.12	214.73	7800.04	113939.46
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TIME = 85.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0386	0.3151	1.1360	67.33	135.77	14.88	0.000763
2	0.2235	0.6178	0.9260	203.09	160.12	3.76	0.004382
3	0.4465	0.7498	0.5889	227.44	175.65	3.59	-0.000675
4	0.5528	0.8279	0.9502	242.97	188.34	3.49	0.002010
5	0.7062	0.8822	0.9089	105.36	198.74	3.35	0.000707
6	0.8104	0.9252	1.0310	115.77	207.88	3.25	0.000707
7	0.8872	0.9468	0.6539	124.91	212.31	3.17	0.000480
8	0.9240	0.9647	0.7289	129.33	215.97	3.13	0.000335
9	0.9537	0.9824	1.1350	132.99	219.73	3.10	0.000243
10	0.9824	0.0000	0.0000	136.75	0.00	2.83	0.000180

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.5085	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.11	214.72	7800.04	113940.30
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TABLE U-7. OPERATING STEP IN FEED COMPOSITION - RUN 1

TIME = 80.00

PLATE	CLASH	CONC	EFFECT	LIQUID	VAPOUR	TEMPERATURE	COEFFICIENT	HEAT LOAD
REFLUX	136.75	-1.508	150.30	0.250				
10	0.9854	0.0000	0.0000	136.75	0.00			113939.46
9	0.9837	0.9854	1.1350	137.99	212.97			
8	0.9839	0.9647	1.1350	137.99	212.97			
7	0.9871	0.9468	0.9540	154.90	212.95			
6	0.8103	0.9525	1.0310	112.77	207.88			
5	0.7001	0.8825	0.9080	107.36	198.74			
4	0.7777	0.8279	0.9501	107.36	198.74			
3	0.4465	0.7497	0.9889	227.44	172.67			
2	0.4465	0.6177	0.9258	203.09	160.12			
1	0.0386	0.3151	1.1350	94.77	132.77			
FEED								

TIME = 85.00

PLATE	CLASH	CONC	EFFECT	LIQUID	VAPOUR	TEMPERATURE	COEFFICIENT	HEAT LOAD
REFLUX	136.75	-1.508	150.30	0.250				
10	0.9854	0.0000	0.0000	136.75	0.00			113940.70
9	0.9837	0.9854	1.1350	137.99	212.97			
8	0.9839	0.9647	1.1350	137.99	212.97			
7	0.9871	0.9468	0.9540	154.90	212.95			
6	0.8103	0.9525	1.0310	112.77	207.88			
5	0.7001	0.8825	0.9080	107.36	198.74			
4	0.7777	0.8279	0.9501	107.36	198.74			
3	0.4465	0.7497	0.9889	227.44	172.67			
2	0.4465	0.6177	0.9258	203.09	160.12			
1	0.0386	0.3151	1.1350	94.77	132.77			
FEED								

TABLE U-7 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 1

TIME = 90.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0387	0.3152	1.1358	67.31	135.78	14.88	0.000557
2	C.2236	0.6180	C.9261	203.08	160.15	3.76	-0.000960
3	0.4466	0.7498	C.5887	227.46	175.66	3.59	0.002596
4	0.5529	0.8280	C.9502	242.97	188.36	3.49	-0.000256
5	C.7063	0.8822	C.9089	105.36	198.76	3.35	0.000446
6	C.8104	0.9252	1.0311	115.77	207.91	3.25	0.000251
7	C.8872	0.9468	C.6539	124.91	212.33	3.17	0.000240
8	0.9240	0.9647	C.7288	129.33	215.99	3.13	0.000150
9	C.9537	C.9824	1.1351	132.99	219.75	3.10	0.000070
10	C.9824	0.0000	C.0000	136.75	0.00	2.83	0.000124

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.5092	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.10	214.71	7800.04	113940.85
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TIME = 95.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0387	0.3153	1.1357	67.29	135.79	14.88	0.000425
2	0.2236	0.6181	C.9262	203.08	160.18	3.76	-0.004822
3	0.4467	0.7498	0.5886	227.46	175.68	3.59	0.005025
4	0.5529	0.8280	C.9502	242.97	188.37	3.49	-0.001890
5	C.7063	0.8822	C.9089	105.36	198.78	3.35	0.000281
6	0.8104	0.9252	1.0311	115.76	207.92	3.25	-0.000062
7	C.8872	0.9468	C.6539	124.91	212.35	3.17	0.000084
8	0.9240	0.9647	C.7288	129.33	216.01	3.13	0.000029
9	0.9537	0.9824	1.1352	132.99	219.76	3.10	-0.000050
10	C.9824	0.0000	C.0000	136.75	0.00	2.83	0.000092

REFLUX	ERROR	FEED	FEED CONC.
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136.75	-1.5095	150.30	0.5599
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.66	200.10	214.70	7800.04	113941.20
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TABLE U-7. WHEN LOOP - STEP IN POSITION - RPT

TIME = 0.0

STATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0387	0.3125	1.1328	67.31	132.72	14.41	0.000257
2	0.2523	0.41	0.2523	101.08	160.12	1.72	-0.000960
3	0.4466	0.4466	0.2523	121.44	172.72	3.32	0.002228
4	0.5229	0.5229	0.2523	142.72	188.72	3.42	-0.000257
5	0.4663	0.8822	0.9089	102.36	198.72	3.32	0.000448
6	0.8104	0.8104	1.0311	112.72	207.72	1.22	0.000257
7	0.8872	0.9466	0.9466	124.72	212.72	3.12	0.000448
8	0.9240	0.9240	0.9240	124.72	212.72	3.12	0.000120
9	0.9237	0.9237	1.1328	132.72	212.72	3.10	0.000120
10	0.9237	0.9237	0.9237	132.72	212.72	3.82	0.000120
REFLX	ERROR	FED	FED CONC.				
136.72	-1.2523	120.30	0.2523				
STEAM	TEMPERATURE						
FLW	REFLX	STEAM	COEFFICIENT	HEAT LOAD			
117.66	200.10	214.72	1800.04	113041.20			

TIME = 22.00

STATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0387	0.3125	1.1328	67.31	132.72	14.41	0.00045
2	0.2523	0.41	0.2523	101.08	160.12	3.72	-0.004825
3	0.4466	0.4466	0.2523	121.44	172.72	1.22	0.000257
4	0.5229	0.5229	0.2523	142.72	188.72	3.42	-0.00189
5	0.4663	0.8822	0.9089	102.36	198.72	3.32	0.000257
6	0.8104	0.8104	1.0311	112.72	207.72	3.22	-0.000042
7	0.8872	0.9466	0.9466	124.72	212.72	3.12	0.000084
8	0.9240	0.9240	0.9240	124.72	212.72	3.12	0.000029
9	0.9237	0.9237	1.1328	132.72	212.72	3.10	-0.000020
10	0.9237	0.9237	0.9237	132.72	212.72	3.82	0.000025
REFLX	ERROR	FED	FED CONC.				
136.72	-1.2523	120.30	0.2523				
STEAM	TEMPERATURE						
FLW	REFLX	STEAM	COEFFICIENT	HEAT LOAD			
117.66	200.10	214.72	1800.04	113041.20			

TABLE U-8 OPEN LCOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0241	0.2382	1.1358	69.44	129.71	14.91	0.000003
2	0.1635	0.5028	0.8575	199.15	147.21	3.80	0.000006
3	0.3494	0.7055	0.7658	216.65	167.72	3.67	0.000005
4	0.5060	0.8095	0.9756	237.16	182.97	3.54	0.000003
5	0.6745	0.8715	0.9313	102.21	194.48	3.38	-0.000000
6	0.7942	0.9131	0.8444	113.72	203.05	3.26	-0.000001
7	0.8687	0.9447	0.8932	122.29	209.90	3.19	-0.000001
8	0.9223	0.9649	0.7882	129.14	214.23	3.13	-0.000001
9	0.9556	0.9804	0.8806	133.47	217.44	3.09	-0.000001
10	0.9804	0.0000	0.0000	136.68	0.00	2.83	-0.000001

REFLUX	ERRCR	FEED	FEED CONC.
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136.68	-1.5095	150.20	0.5383
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	202.34	223.30	5376.66	112706.08
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TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0191	0.2146	1.1514	69.30	128.07	14.92	-0.092965
2	0.1388	0.4510	0.8392	197.55	142.91	3.81	-0.306004
3	0.2975	0.6742	0.8096	212.57	163.13	3.71	-0.515702
4	0.4588	0.7848	0.9295	233.16	177.49	3.58	-0.321045
5	0.6482	0.8596	0.8954	97.61	190.75	3.40	-0.311173
6	0.7833	0.9086	0.8452	111.17	200.66	3.27	-0.197964
7	0.8652	0.9432	0.8916	121.27	208.12	3.19	-0.087035
8	0.9214	0.9645	0.7884	128.82	212.66	3.13	-0.033160
9	0.9554	0.9803	0.8792	133.40	215.93	3.09	-0.010321
10	0.9804	0.0000	0.0000	136.68	0.00	2.83	-0.004965

REFLUX	ERRCR	FEED	FEED CONC.
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136.68	0.0023	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	203.18	224.12	5376.66	112617.97
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TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 10.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0140	0.1792	1.1669	70.69	125.63	14.93	-0.040646
2	0.1166	0.3936	0.8227	196.40	138.41	3.83	-0.213529
3	0.2583	0.6404	0.8428	209.31	158.72	3.74	-0.396193
4	0.4342	0.7707	0.9054	229.90	174.65	3.60	-0.282154
5	0.6243	0.8483	0.8628	95.88	187.88	3.43	-0.278641
6	0.7667	0.9019	0.8464	109.38	198.46	3.29	-0.202310
7	0.8569	0.9395	0.8876	120.16	206.46	3.20	-0.107838
8	0.9175	0.9627	0.7895	128.26	211.36	3.13	-0.055287
9	0.9538	0.9794	0.8653	133.22	214.79	3.10	-0.025093
10	0.9797	0.0000	0.0000	136.68	0.00	2.83	-0.023224

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.0652	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	204.14	225.06	5376.66	112517.09
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TIME = 15.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0114	0.1572	1.1748	72.15	124.20	14.94	-0.023742
2	0.1018	0.3547	0.8118	196.39	135.61	3.83	-0.145109
3	0.2310	0.6144	0.8659	207.89	155.49	3.75	-0.265591
4	0.4145	0.7589	0.8862	227.94	172.41	3.62	-0.192550
5	0.6030	0.8382	0.8336	94.83	185.46	3.45	-0.229595
6	0.7504	0.8955	0.8476	108.10	196.50	3.31	-0.182793
7	0.8478	0.9356	0.8832	119.32	204.89	3.21	-0.105608
8	0.9127	0.9605	0.7908	127.82	210.10	3.14	-0.059142
9	0.9515	0.9781	0.8449	133.10	213.65	3.10	-0.029225
10	0.9785	0.0000	0.0000	136.68	0.00	2.83	-0.031862

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.1840	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	204.63	225.54	5376.66	112465.54
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TIME = 10.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	WELD-UP	DERIVATIVE
1	0.0140	0.1797	1.1869	70.49	157.09	14.93	-0.00000
2	0.1166	0.3998	0.8557	106.41	198.41	1.83	-0.01325
3	0.2583	0.6444	0.8428	209.31	151.75	1.14	-0.036193
4	0.4345	0.7707	0.9054	277.77	174.77	1.60	-0.07117
5	0.6243	0.8483	0.8628	357.98	187.88	1.64	-0.073064
6	0.7667	0.9019	0.8444	409.34	198.40	1.74	-0.050310
7	0.8444	0.9395	0.8444	450.16	206.46	1.74	-0.04088
8	0.9175	0.9627	0.7897	471.36	211.36	3.13	-0.02257
9	0.9538	0.9794	0.8623	471.74	214.79	1.10	-0.02093
10	0.9491	0.9600	0.9001	471.68	0.00	1.74	-0.04088

REFLUX 136.68 ERROR 0.0625 FEED 150.50 FEED CONC. 0.4794

STEAM FLOW 117.00 REBILIER STEAM 204.14 TEMPERATURE 177.00 COEFFICIENT 3376.66 HEAT LOAD 115215.00

TIME = 15.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	WELD-UP	DERIVATIVE
1	0.0114	0.1575	1.1704	75.12	157.78	14.94	-0.023745
2	0.1013	0.3547	0.8118	106.39	197.71	1.78	-0.042109
3	0.2310	0.6144	0.8699	217.77	157.49	1.77	-0.062501
4	0.4145	0.7589	0.8865	257.94	175.41	1.64	-0.019255
5	0.6030	0.8387	0.8336	34.83	18.46	1.41	-0.022947
6	0.7504	0.8925	0.8478	108.10	196.50	3.31	-0.018793
7	0.8444	0.9326	0.8835	117.35	204.89	3.21	-0.040008
8	0.9157	0.9605	0.7908	157.95	210.10	3.14	-0.040145
9	0.9251	0.9701	0.8449	137.10	213.65	1.10	-0.020255
10	0.9785	0.9600	0.9000	136.68	0.00	1.93	-0.031805

REFLUX 136.68 ERROR 0.1840 FEED 150.50 FEED CONC. 0.4794

STEAM FLOW 117.00 REBILIER STEAM 204.63 TEMPERATURE 252.54 COEFFICIENT 3376.66 HEAT LOAD 1154.54

TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0100	0.1443	1.1792	73.45	123.35	14.94	-0.011586
2	0.0933	0.3286	0.8055	196.83	133.83	3.84	-0.074271
3	0.2135	0.5940	0.8807	207.34	153.13	3.77	-0.166975
4	0.3997	0.7498	0.8717	226.75	170.82	3.63	-0.146993
5	0.5856	0.8299	0.8099	94.37	183.57	3.46	-0.182463
6	0.7363	0.8901	0.8486	107.28	194.92	3.32	-0.154254
7	0.8397	0.9321	0.8793	118.78	203.57	3.22	-0.089245
8	0.9080	0.9585	0.7921	127.52	209.02	3.14	-0.052044
9	0.9491	0.9767	0.8239	133.03	212.65	3.10	-0.028895
10	0.9772	0.0000	0.0000	136.68	0.00	2.84	-0.031189

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.3220	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	FEED STEAM	COEFFICIENT	HEAT LOAD
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117.00	204.90	225.81	5376.66	112436.75
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0093	0.1371	1.1815	74.46	122.88	14.94	-0.006736
2	0.0884	0.3129	0.8018	197.35	132.77	3.84	-0.043314
3	0.2025	0.5812	0.8900	207.27	151.86	3.77	-0.106751
4	0.3900	0.7437	0.8622	226.43	169.78	3.64	-0.089950
5	0.5731	0.8232	0.7929	94.21	182.12	3.47	-0.120094
6	0.7246	0.8856	0.8495	106.66	193.70	3.33	-0.127754
7	0.8329	0.9292	0.8761	118.37	202.55	3.22	-0.075093
8	0.9040	0.9567	0.7932	127.30	208.18	3.15	-0.045175
9	0.9470	0.9755	0.8053	132.98	211.86	3.10	-0.024827
10	0.9758	0.0000	0.0000	136.68	0.00	2.84	-0.026899

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.4534	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	FEED STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.06	225.97	5376.66	112419.85
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TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0088	0.1328	1.1828	75.25	122.61	14.94	-0.003694
2	0.0854	0.3034	0.7996	197.87	132.14	3.84	-0.024421
3	0.1958	0.5735	0.8957	207.41	151.11	3.78	-0.062806
4	0.3840	0.7400	0.8564	226.42	169.16	3.64	-0.053759
5	0.5650	0.8184	0.7817	94.32	181.13	3.48	-0.078522
6	0.7156	0.8822	0.8501	106.36	192.81	3.34	-0.089380
7	0.8274	0.9268	0.8734	118.13	201.78	3.23	-0.056014
8	0.9006	0.9552	0.7941	127.15	207.54	3.15	-0.035244
9	0.9452	0.9744	0.7895	132.96	211.24	3.11	-0.018954
10	0.9747	0.0000	0.0000	136.68	0.00	2.84	-0.024231

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.5636	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.15	226.06	5376.66	112410.13
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0086	0.1305	1.1835	75.85	122.46	14.94	-0.001863
2	0.0837	0.2982	0.7984	198.31	131.78	3.84	-0.012151
3	0.1920	0.5692	0.8988	207.65	150.68	3.78	-0.035410
4	0.3805	0.7379	0.8530	226.57	168.80	3.64	-0.030007
5	0.5598	0.8154	0.7746	94.50	180.50	3.49	-0.047948
6	0.7095	0.8800	0.8506	106.25	192.22	3.34	-0.057248
7	0.8235	0.9251	0.8716	118.03	201.24	3.23	-0.037579
8	0.8981	0.9541	0.7948	127.08	207.08	3.15	-0.024651
9	0.9439	0.9736	0.7774	132.95	210.79	3.11	-0.013765
10	0.9738	0.0000	0.0000	136.68	0.00	2.84	-0.018594

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.6532	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.20	226.11	5376.66	112405.03
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TIME = 30.00

PLATE	CONC	CONV	EFFICI	LIQUID	VAPOR	HELD-UP	WATER
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FLW	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED CONC.	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TIME = 35.00

PLATE	CONC	CONV	EFFICI	LIQUID	VAPOR	HELD-UP	WATER
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FLW	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FEED CONC.	130.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 40.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0085	0.1293	1.1838	76.26	122.38	14.94	-0.000842
2	C.0829	0.2955	0.7978	198.64	131.61	3.85	-0.005419
3	C.1901	0.5669	0.9005	207.87	150.46	3.78	-0.018739
4	C.3786	0.7368	0.8511	226.73	168.60	3.64	-0.015788
5	C.5567	0.8138	0.7703	94.68	180.14	3.49	-0.028004
6	C.7059	0.8786	0.8508	106.26	191.86	3.35	-0.033108
7	C.8211	0.9241	0.8704	118.00	200.89	3.23	-0.022796
8	C.8964	0.9534	0.7952	127.06	206.78	3.16	-0.015962
9	C.9429	0.9730	0.7691	132.96	210.48	3.11	-0.007084
10	C.9732	0.0000	C.0000	136.68	0.00	2.84	-0.015442

REFLUX	ERRCR	FEED	FEED CONC.
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136.68	C.7187	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.23	226.13	5376.66	112402.61
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TIME = 45.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	C.0085	0.1287	1.1839	76.51	122.34	14.94	-0.000211
2	C.0824	0.2943	0.7975	198.85	131.53	3.85	-0.005694
3	C.1891	0.5658	0.9014	208.04	150.35	3.78	-0.004710
4	C.3776	0.7362	0.8501	226.87	168.50	3.65	-0.008999
5	0.5549	0.8129	0.7680	94.82	179.95	3.49	-0.014850
6	C.7038	0.8778	0.8510	106.29	191.65	3.35	-0.018600
7	C.8196	0.9234	0.8697	118.01	200.69	3.24	-0.013307
8	C.8954	0.9530	0.7955	127.06	206.59	3.16	-0.009420
9	0.9423	0.9727	0.7638	132.97	210.29	3.11	-0.005634
10	0.9728	0.0000	C.0000	136.68	0.00	2.84	-0.008073

REFLUX	ERRCR	FEED	FEED CONC.
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136.68	C.7617	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.23	226.14	5376.66	112401.61
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TABLE 10-7. OPEN LOOP - STEP IN FEED COMPOSITION - RUN

TIME = 40.00

PLATE	CONC	CONC EFFICI	LIQID	VAPOR	HELD-UP	RELATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLEX ERROR FEED FEED
136.68 0.7187 100.20 0.4794

STEAM REBILIER STEAM TEMPERATURE
COEFFICIENT HEAT LOAD
117.00 502.23 0.11 2376.86 115403.81

TIME = 45.00

PLATE	CONC	CONC EFFICI	LIQID	VAPOR	HELD-UP	RELATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLEX ERROR FEED FEED
136.68 0.7187 100.20 0.4794

STEAM REBILIER STEAM TEMPERATURE
COEFFICIENT HEAT LOAD
117.00 502.23 0.11 2376.86 115403.81

TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 50.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0085	0.1285	1.1839	76.65	122.33	14.94	-0.000068
2	0.0823	0.2937	0.7974	198.99	131.49	3.85	-0.000584
3	0.1886	0.5653	0.9017	208.15	150.30	3.78	-0.003636
4	0.3772	0.7359	0.8497	226.96	168.45	3.65	-0.003492
5	0.5540	0.8124	0.7667	94.91	179.85	3.49	-0.007668
6	0.7026	0.8774	0.8511	106.32	191.54	3.35	-0.009857
7	0.8188	0.9231	0.8693	118.02	200.57	3.24	-0.007364
8	0.8948	0.9527	0.7956	127.06	206.49	3.16	-0.005291
9	0.9420	0.9724	0.7606	132.98	210.18	3.11	-0.003660
10	0.9725	0.0000	0.0000	136.68	0.00	2.84	-0.004477

REFLUX	ERRCR	FEED	FEED CONC.
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136.68	0.7882	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.24	226.14	5376.66	112401.34
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TIME = 55.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0085	0.1285	1.1839	76.74	122.33	14.94	0.000050
2	0.0822	0.2936	0.7974	199.06	131.48	3.85	-0.000943
3	0.1885	0.5651	0.9017	208.22	150.29	3.78	0.000209
4	0.3769	0.7358	0.8496	227.03	168.43	3.65	-0.001708
5	0.5536	0.8122	0.7661	94.97	179.80	3.49	-0.003234
6	0.7020	0.8772	0.8511	106.34	191.48	3.35	-0.004752
7	0.8183	0.9229	0.8691	118.03	200.51	3.24	-0.003796
8	0.8945	0.9526	0.7957	127.06	206.43	3.16	-0.002851
9	0.9418	0.9723	0.7588	132.99	210.12	3.11	-0.001997
10	0.9723	0.0000	0.0000	136.68	0.00	2.84	-0.002560

REFLUX	ERRCR	FEED	FEED CONC.
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136.68	0.8037	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.24	226.14	5376.66	112401.33
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TABLE 1 - OPEN LOOP - 2000 IN FEED POSITIVE - 2000

TIME = 20.00

PLATE	CONC	CONC EFFICI	LIQID	VAPOR	WGT-UP	WGT-DN
1	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
2	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
3	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
4	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
5	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
6	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
7	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
8	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
9	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
10	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088

REFLUX FRCR FEED FEED CONC.
136.68 0.1282 1.1839 0.1282

STEAM REFLUX TEMPERATURE
117.00 202.24 126.14 236.68
COEFFICIENT HEAT LOAD
11541.34

TIME = 20.00

PLATE	CONC	CONC EFFICI	LIQID	VAPOR	WGT-UP	WGT-DN
1	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
2	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
3	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
4	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
5	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
6	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
7	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
8	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
9	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088
10	0.0082	0.1282	1.1839	1.1839	14.94	-0.000088

REFLUX FRCR FEED FEED CONC.
136.68 0.1282 1.1839 0.1282

STEAM REFLUX TEMPERATURE
117.00 202.24 126.14 236.68
COEFFICIENT HEAT LOAD
11541.34

TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 60.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0085	0.1285	1.1839	76.78	122.33	14.94	0.000045
2	0.0822	0.2936	0.7974	199.11	131.48	3.85	0.000881
3	0.1885	0.5651	0.9017	208.26	150.29	3.78	-0.000708
4	0.3769	0.7358	0.8496	227.07	168.43	3.65	0.000181
5	0.5534	0.8121	0.7660	95.01	179.78	3.49	-0.001289
6	0.7018	0.8771	0.8511	106.37	191.46	3.35	-0.001817
7	0.8181	0.9228	0.8690	118.04	200.48	3.24	-0.001688
8	0.8943	0.9525	0.7958	127.07	206.40	3.16	-0.001372
9	0.9417	0.9722	0.7578	132.99	210.09	3.11	-0.001019
10	0.9723	0.0000	0.0000	136.68	0.00	2.84	-0.001348

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.8122	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.24	226.14	5376.66	112401.44
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TIME = 65.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0085	0.1285	1.1839	76.80	122.33	14.94	0.000066
2	0.0822	0.2937	0.7974	199.13	131.49	3.85	-0.000434
3	0.1885	0.5651	0.9017	208.29	150.29	3.78	0.001358
4	0.3769	0.7358	0.8496	227.09	168.43	3.65	-0.000037
5	0.5533	0.8121	0.7660	95.03	179.78	3.49	-0.000171
6	0.7017	0.8771	0.8511	106.38	191.45	3.35	-0.000594
7	0.8180	0.9228	0.8689	118.05	200.47	3.24	-0.000667
8	0.8942	0.9525	0.7958	127.07	206.39	3.16	-0.000591
9	0.9416	0.9722	0.7573	132.99	210.08	3.11	-0.000470
10	0.9722	0.0000	0.0000	136.68	0.00	2.84	-0.000642

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.8165	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.24	226.14	5376.66	112401.56
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TABLE II-1 HEAT FLOW - STEAM II REBOILER - CONT.

TIME		HEAT FLOW		EFFICIENCY		LIQUID		VAPOR		DIFFERENTIAL	
PLATE	CONC	CONC	EFFICIENCY	LIQUID	VAPOR	DIFFERENTIAL	PLATE	CONC	CONC	EFFICIENCY	LIQUID
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	6	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	10	0.0000	0.0000	0.0000	0.0000
REFLUX	100.00	100.00	100.00	100.00	100.00	100.00	REFLUX	100.00	100.00	100.00	100.00
STEAM	100.00	100.00	100.00	100.00	100.00	100.00	STEAM	100.00	100.00	100.00	100.00
FLOW	100.00	100.00	100.00	100.00	100.00	100.00	FLOW	100.00	100.00	100.00	100.00
117.00	200.00	200.00	200.00	200.00	200.00	200.00	117.00	200.00	200.00	200.00	200.00

TIME		HEAT FLOW		EFFICIENCY		LIQUID		VAPOR		DIFFERENTIAL	
PLATE	CONC	CONC	EFFICIENCY	LIQUID	VAPOR	DIFFERENTIAL	PLATE	CONC	CONC	EFFICIENCY	LIQUID
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	6	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	10	0.0000	0.0000	0.0000	0.0000
REFLUX	100.00	100.00	100.00	100.00	100.00	100.00	REFLUX	100.00	100.00	100.00	100.00
STEAM	100.00	100.00	100.00	100.00	100.00	100.00	STEAM	100.00	100.00	100.00	100.00
FLOW	100.00	100.00	100.00	100.00	100.00	100.00	FLOW	100.00	100.00	100.00	100.00
117.00	200.00	200.00	200.00	200.00	200.00	200.00	117.00	200.00	200.00	200.00	200.00

TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 70.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0085	0.1285	1.1839	76.81	122.33	14.94	0.000030
2	0.0822	0.2938	0.7974	199.14	131.49	3.85	0.000975
3	0.1886	0.5652	0.9017	208.30	150.30	3.78	-0.000394
4	0.3769	0.7358	0.8496	227.11	168.43	3.65	0.000780
5	0.5533	0.8121	0.7660	95.04	179.78	3.49	0.000170
6	0.7016	0.8771	0.8511	106.39	191.45	3.35	-0.000032
7	0.8180	0.9227	0.8689	118.05	200.47	3.24	-0.000180
8	0.8942	0.9525	0.7958	127.08	206.39	3.16	-0.000200
9	0.9416	0.9722	0.7571	133.00	210.07	3.11	-0.000185
10	0.9722	0.0000	0.0000	136.68	0.00	2.84	-0.000267

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.8185	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.23	226.14	5376.66	112401.64
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TIME = 75.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0085	0.1286	1.1839	76.81	122.34	14.94	0.000044
2	0.0823	0.2938	0.7974	199.15	131.50	3.85	-0.000489
3	0.1886	0.5653	0.9017	208.31	150.30	3.78	0.001303
4	0.3770	0.7359	0.8496	227.11	168.43	3.65	0.000050
5	0.5534	0.8121	0.7660	95.04	179.78	3.49	0.000335
6	0.7016	0.8771	0.8511	106.39	191.45	3.35	0.000124
7	0.8179	0.9227	0.8689	118.06	200.47	3.24	-0.000001
8	0.8942	0.9525	0.7958	127.08	206.39	3.16	-0.000053
9	0.9416	0.9722	0.7571	133.00	210.07	3.11	-0.000065
10	0.9722	0.0000	0.0000	136.68	0.00	2.84	-0.000078

REFLUX	ERROR	FEED	FEED CONC.
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136.68	0.8191	150.20	0.4794
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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117.00	205.23	226.14	5376.66	112401.71
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TABLE 1 - OPEN L - 1000 IN FEED OF DISTILL - 1000

TIME - 12.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	LD-UP	DERIVATIVE
1	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
2	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
3	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
4	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
5	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
6	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
7	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
8	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
9	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
10	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000

REFLUX	FEED	FEED CONC.
136.68	0.8182	150.20
		0.4794

STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD
117.00	202.23	226.14	115401.84

TIME - 12.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	LD-UP	DERIVATIVE
1	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
2	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
3	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
4	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
5	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
6	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
7	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
8	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
9	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000
10	C.0085	C.1585	1.11	10.81	10.81	10.81	0.000000

REFLUX	FEED	FEED CONC.
136.68	0.8182	150.20
		0.4794

STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD
117.00	202.23	226.14	115401.84

TABLE U-8 OPEN LOOP - STEP IN FEED COMPOSITION - RUN 2

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0085	0.1286	1.1839	76.81	122.34	14.94	0.000009
2	0.0823	0.2939	0.7974	199.15	131.50	3.85	0.000874
3	0.1886	0.5653	0.9017	208.31	150.31	3.78	-0.000571
4	0.3770	0.7359	0.8496	227.12	168.44	3.65	0.000668
5	0.5534	0.8121	0.7660	95.05	179.79	3.49	0.000260
6	0.7017	0.8771	0.8511	106.40	191.45	3.35	0.000203
7	0.8180	0.9227	0.8689	118.06	200.47	3.24	0.000083
8	0.8942	0.9525	0.7958	127.08	206.39	3.16	0.000028
9	0.9416	0.9722	0.7571	133.00	210.07	3.11	0.000001
10	0.9722	0.0000	0.0000	136.68	0.00	2.84	-0.000010

REFLUX ERROR FEED FEED CONC.

136.68 0.8193 150.20 0.4794

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBOILER STEAM

117.00 205.23 226.14 5376.66 112401.77

TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0085	0.1286	1.1839	76.81	122.34	14.94	0.000029
2	0.0823	0.2939	0.7974	199.15	131.50	3.85	-0.000589
3	0.1887	0.5653	0.9017	208.31	150.31	3.78	0.001136
4	0.3770	0.7359	0.8496	227.12	168.44	3.65	-0.000100
5	0.5534	0.8121	0.7660	95.05	179.79	3.49	0.000280
6	0.7017	0.8771	0.8511	106.40	191.45	3.35	0.000164
7	0.8180	0.9227	0.8689	118.06	200.47	3.24	0.000089
8	0.8942	0.9525	0.7958	127.08	206.39	3.16	0.000041
9	0.9416	0.9722	0.7571	133.00	210.07	3.11	0.000020
10	0.9722	0.0000	0.0000	136.68	0.00	2.84	0.000014

REFLUX ERROR FEED FEED CONC.

136.68 0.8193 150.20 0.4794

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLCW REBOILER STEAM

117.00 205.23 226.14 5376.66 112401.79

C. Closed Loop Experiments - "Young Equation"

Subroutine "Main" - Inclusion of this Fortran subroutine shows the changes made in the Unsteady Program when the overhead composition controller was included.

<u>Table</u>	<u>Title</u>
U-9	Closed Loop - Step in Feed Flow - Run 1
U-10	Closed Loop - Step in Feed Flow - Run 2
U-11	Closed Loop - Step in Steam Flow - Run 1
U-12	Closed Loop - Step in Steam Flow - Run 2
U-13	Closed Loop - Step in Comp. Cont. Set Pnt. - Run 1
U-14	Closed Loop - Step in Comp. Cont. Set Pnt. - Run 2

IBFTC COLUMN NODECK

C**

C** YOUNG EQUATION

C**

0COMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20
1),XT(10),

1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
10),F(10),QR,

2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
110),YE(10),

3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
1DXT(10)

4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLE(20),DROL
1(20)

5,ITIT(10)

COMMON DT,NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
1NPDH

REAL XTT(10),KP,KINT,LRFL,HV(10),LT,LX10

REAL AX(500),AY(500,6),XP(500),DX(10),TD(50),XTD(50,10
1)

REWIND 3

1 FORMAT (1X,12I5)

2 FORMAT (1X,F11.6,5F12.6)

29 FORMAT (1X,I5,4F15.8,F10.4)

75 FORMAT (1X,I4,5F13.6)

READ(5,1) NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPR,NPDH

WRITE(6,1)NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPR,NPDH

RAT=32.04/18.016

C** EQUILIBRIUM DATA

DO 4 J=1,NPX

4 READ (5,5) XEF(J),YEF(J)

C** LIQUID ENTHALPY DATA

DO 6 J=1,NPH

6 READ(5,5) XHL(J),HLF(J)

5 FORMAT (6X,2F15.8)

C** LIQUID DENSITY DATA

DO 8 J=1,NPD

8 READ (5,7) XDL(J),ROLT(J)

7 FORMAT (1X,5F10.6)

C** DERIVATIVES OF HL AND W

DO 12 J=1,NPDH

12 READ (5,2) DXHD(J),DHLE(J),DROL(J)

C** TEMPERATURE OF THE LIQUID IN REBOILER

READ(5,2) (TLX(N),N=1,NPR)

WRITE(6,2)(TLX(N),N=1,NPR)

READ(5,2) (TLY(N),N=1,NPR)

WRITE(6,2)(TLY(N),N=1,NPR)

C** CONSTANTS FOR REFLUX FLOW RATE

BRD=ALOG(200./71.)/ALOG(72./10.)

ARD=200./((72.**BRD)

C** DATA FOR TRANSIENT RUN

DO 35 NR=1,ND

WRITE(6,37)

WRITE(4,37)

37 FORMAT (1H1)

YOUNG EQUATION

COMMON XEF(30),YEF(30),XHL(50),HLE(50),XDL(50),W(10),
1),XT(10),
LYT(10),L(10),VT(10),HLT(10),HAT(10),WT(10),W(10),H(10),
10),F(10),
SX(10),EMX(10,5),EMY(10,5),TLX(10),TLY(10),UAX(10),UAY(10),
10),YE(10),
3EM(10),TR,2(5),T2,UA,2F,UA,BU,RAT,AHLU,BHU,H2I,H2F,XF,
10),
4,VI,VR,VP(10),VC,CLY(10,5),ERXS,UXHI(10),DHLF(50),DROL
1(50)
2,ITIT(10)
COMMON DT,NI,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KL,
INPD
REAL XTI(10),KP,KINT,LREL,HV(10),LT,LX10
REAL AX(50),AY(50),XP(50),GX(10),TD(50),XTI(50),

1)
REWIND 3
1 FORMAT (1X,15I5)
2 FORMAT (1X,F11.6,2F12.6)
29 FORMAT (1X,12,4F12.6,F11.4)
75 FORMAT (1X,14,2F13.6)
READ(5,1) NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KL
WRITE(6,1)NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KL
RAT=32.04/18.016
EQUILIBRIUM DATA
CO 4 J=1,NPX
4 READ (5,2) XEF(1),YEF(1)
LIQUID ENTHALPY DATA
CO 6 J=1,NPH
6 READ(5,2) XHL(1),HLE(1)
2 FORMAT (6X,2F12.8)
LIQUID DENSITY DATA
CO 8 J=1,NPD
8 READ (5,7) XDL(1),RDLT(1)
7 FORMAT (1X,2F10.6)
DERIVATIVES OF HL AND W
CO 12 J=1,NPDH
12 READ (5,2) DXHI(1),DHLF(1),DROL(1)
TEMPERATURE OF THE LIQUID IN REBOLLER
READ(5,2) (TLX(N),N=1,NPR)
WRITE(6,2)(TLX(N),N=1,NPR)
READ(5,2) (TLY(N),N=1,NPR)
WRITE(6,2)(TLY(N),N=1,NPR)
CONSTANTS FOR REFLUX FLOW RATE
BRD=ALOG(200.771)/ALOG(12.710)
ARD=200.771/25.771
DATA FOR TRANSIENT RUN
CO 32 NR=1,ND
WRITE(6,37)
WRITE(4,37)
37 FORMAT (1H)

```

DTOUT=0.0
DI=0.0
DK=0.0
ERX1=0.0
SUMER=0.0
KE=1
KIT=0
KST=0
READ(5,36) (ITIT(J),J=1,10)
36 FORMAT (1X,10A6)
READ(5,1) LF
READ(5,2) TFIN,STEP,TOUT,KP,KINT,DTD
WRITE(6,2) TFIN,STEP,TOUT,KP,KINT,DTD
READ(5,24) VR,(VP(N),N=2,NTT),VC
WRITE(6,24) VR,(VP(N),N=2,NTT),VC
24 FORMAT (1H,10F7.4)
READ(5,26) SLCC,DT,STEPXD
DT=DT/60.
WRITE(6,26) SLCC,ARD,BRD,DT,STEPXD
SLCC=100./SLCC
WRITE(6,26) SLCC
READ(5,26) UA,AHLO,BHLO,HSI
WRITE(6,26) UA,AHLO,BHLO,HSI
26 FORMAT (6X,4F15.8)
READ(5,14) F(1),STEPF,SF,STEPS,PCS,STEPR,XF,STEPXF,SPG
WRITE(6,14) F(1),STEPF,SF,STEPS,PCS,STEPR,XF,STEPXF,SPG
14 FORMAT (1X,6F9.4,3F7.4)
PC1=PCS
AV=1.+DTD/(2.*KINT)
BV=DTD/(KINT*DT*60.)
CV=1.+2.5*DTD/KINT
DV=AV+BV
GAIN=100./KP
SUME1=0.0
C** INITIAL AND FINAL EFFICIENCIES AND HEAT LOSSES
DO 10 N=1,NTT
READ(5,11) EMX(N,1),EMY(N,1),QLY(N,1),EMX(N,2),EMY(N,2
1),QLY(N,2)
10 WRITE(6,11) EMX(N,1),EMY(N,1),QLY(N,1),EMX(N,2),EMY(N,2
1),QLY(N,2)
11 FORMAT (1X,2(F11.8,F12.8,F16.8))
C** EXPERIMENTAL TRANSIENT DATA
READ(5,1) NEXP
DO 15 J=1,NEXP
15 READ(5,16) TD(J),(XTD(J,N),N=1,NPI)
16 FORMAT (1X,11F7.4)
C** INITIAL VALUES OF THE LIQUID COMPOSITIONS
READ (5,2) (XT(J),J=1,NPI)
WRITE(6,2) (XT(J),J=1,NPI)
WRITE(6,76)
76 FORMAT (1HK,16H INITIAL VALUES)
C** ENTHALPY OF THE FEED
DO 80 J=9,NPH
IF (XHL(J)-XF) 80,81,82
80 CONTINUE

```



```

80 CONTINUE
IF (XHL(J)-XF) 80,81,82
DO 80 J=9,NPH
*** ENTHALPY OF THE FEED
76 FORMAT (1H,10H INITIAL VALUES)
WRITE(6,76)
WRITE(6,2) (XT(J),J=1,NP1)
READ(6,2) (XT(J),J=1,NP1)
*** INITIAL VALUES OF THE LIQUID COMPOSITIONS
76 FORMAT (1X,11F7.4)
16 READ(6,16) TD(J), (XTD(J,N),N=1,NP1)
DO 15 J=1,NEXP
READ(6,1) NEXP
*** EXPERIMENTAL TRANSIENT DATA
11 FORMAT (1X,2F11.8,F15.8,F16.8)
1),GLY(N,2)
10 WRITE(6,1)EMX(N,1),EMY(N,1),GLY(N,1),EMX(N,1),EMY(N,1)
1),GLY(N,2)
READ(6,11) EMX(N,1),EMY(N,1),GLY(N,1),EMX(N,1),EMY(N,1)
DO 10 N=1,NTT
*** INITIAL AND FINAL EFFICIENCIES AND HEAT LOSSES
SUMEI=0.0
GAIN=100.\KP
CV=AV+BV
CV=1.+2.*DTD\KINT
BV=DTD\KINT*60.)
AV=1.+7.D\2.*KINT)
PCI=PC2
14 FORMAT (1X,6F9.4,3F7.4)
WRITE(6,14)F(1),STEPF,2F,2STEP2,PC2,2STEP2,XF,2STEP2,2PC2
READ(6,14) F(1),STEPF,2F,2STEP2,PC2,2STEP2,XF,2STEP2,2PC2
26 FORMAT (6X,4F15.8)
WRITE(6,26)UA,AHLO,BHLO,H2I
READ(6,26) UA,AHLO,BHLO,H2I
WRITE(6,26) SLCC
SLCC=100.\SLCC
WRITE(6,26) SLCC,ARD,BRD,DT,STEPXD
CT=DT\60.
READ(6,26) SLCC,DT,STEPXD
24 FORMAT (1H,10F7.4)
WRITE(6,24)VR,(VP(N),N=2,NTT),VC
READ(6,24)VR,(VP(N),N=2,NTT),VC
WRITE(6,2)TFIN,STEP,TOUT,KP,KINT,DID
READ(6,2)TFIN,STEP,TOUT,KP,KINT,DID
READ(6,1)LF
36 FORMAT (1X,10A6)
READ(6,36) (TTIT(J),J=1,10)
K2T=0
KIT=0
KE=1
SUMER=0.0
FRXI=0.0
DK=0.0
CI=0.0
CTOUT=0.0

```



```

81 HF=HLF(J)
GO TO 34
82 SLOPE=(HLF(J)-HLF(J-1))/(XHL(J)-XHL(J-1))
HF=SLOPE*(XF-XHL(J-1))+HLF(J-1)
34 LT(NPI)=LRFL
XD=XT(NPI)
C** INITIAL VALUES
CALL PROPER
DO 19 N=1,NPI
X(N)=XT(N)
HL(N)=HLT(N)
19 W(N)=WT(N)
CALL EFFICI
LT(NPI)=SQRT(SPG)*ARD*(PCS**BRD)
CALL FLOWS
CALL DERIV
DO 20 N=1,NPI
20 DX(N)=DXT(N)
DO 32 K=1,NPI
WRITE(6,75) K,HVT(K),HL(K),W(K),HF
WRITE(6,75) K,X(K),YE(K),EM(K),DX(K)
32 WRITE(6,75) K,XT(K),YT(K),LT(K),VT(K)
C** EXPERIMENTAL DATA ON TAPE
DO 17 J=1,NEXP
17 WRITE(3,400) TD(J),(XTD(J,N),N=1,NTT)
WRITE(3,401)
C** CALCULATION OF DERIVATIVE AT I+1
I=1
WRITE(6,551)
551 FORMAT (1H1)
GO TO 100
48 DO 45 N=1,NPI
X(N)=XT(N)
XT(N)=XT(N)+DT*DX(N)
45 XTT(N)=XT(N)
CALL PROPER
CALL EFFICI
C** OVERHEAD COMPOSITION CONTROLLER
ERX2=SLCC*(XD-XT(NPI))
SUME=SUME1+(ERX2+ERX1)*DT*30.
PROP=GAIN*CV*ERX2
PINT=GAIN*SUME/KINT
DER=-GAIN*DTD*SLCC*DXT(NPI)/60.
PC=(AV*PCS+B*PC1+PROP+PINT+DER)/DV
LT(NPI)=SQRT(SPG)*ARD*(PC**BRD)
CALL FLOWS
CALL DERIV
46 DO 53 N=1,NPI
DXAVE=(DX(N)+DXT(N))/2.
C** NEW X IS CALCULATED
53 XT(N)=X(N)+DT*DXAVE
C** CHECK ON CONVERGENCE
721 KIT=KIT+1
DO 55 N=1,NPI
ERRX=ABS((XT(N)-XTT(N))/XTT(N))

```

```

81 H=HLE(J)
82 SLOPE=(LF(J)-LF(J-1))/(XHL(J)-XHL(J-1))
H=2*SLOPE*(XHL(J-1))+HLE(J-1)
34 LT(NPI)=LRF
XD=XI(NPI)
** INITIAL VALUES
CALL PROPER
CO 19 N=1,NPI
X(N)=XI(N)
H(N)=HLE(N)
19 W(N)=WT(N)
CALL EFFICI
LT(NPI)=2*RT(2PG)*ARD*(PC2**BRD)
CALL FLOW2
CALL DERIV
CO 20 N=1,NPI
20 DX(N)=DXI(N)
CO 32 K=1,NPI
WRITE(6,72) K,XI(K),H(K),W(K),H
WRITE(6,72) K,X(K),YE(K),FM(K),DX(K)
32 WRITE(6,72) K,XI(K),YI(K),LT(K),V(K)
** EXPERIMENTAL DATA ON TAPE
CO 17 J=1,NEXP
17 WRITE(3,40) ID(J),(XIB(J,N),N=1,NTI)
WRITE(3,40)
** CALCULATION OF DERIVATIVE AT I+1
I=1
WRITE(6,22)
22 FORMAT(1H)
GO TO 100
48 CO 42 N=1,NPI
X(N)=XI(N)
XI(N)=XI(N)+DT*DX(N)
42 XI(N)=XI(N)
CALL PROPER
CALL EFFICI
** OVERHEAD COMPOSITION CONTROLLER
ERX2=2*LC*(XI-NPI)
SUME=SUME1+(ERX2+ERX1)*DT*30.
PROP=GAIN*CV*ERX2
PINT=GAIN*SUME/KINT
ER=-GAIN*DTB*2*LC*DXI(NPI)*60.
PC=(AV*PC2+B*V*PC1+PROP+PINT+UB)*VDV
LT(NPI)=2*RT(2PG)*ARD*(PC**BRD)
CALL FLOW2
CALL DERIV
CO 23 N=1,NPI
23 DX(N)=DXI(N)+DT*DXI(N)*2.
** NEW X IS CALCULATED
23 XI(N)=X(N)+DT*DX(N)
** CHECK ON CONVERGENCE
23 K=K+1
CO 25 N=1,NPI
ERX=ABS((XI(N)-XI(N-1))/XI(N))

```



```

        IF (ERRX.GT.0.0001) GO TO 56
55  CONTINUE
        GO TO 66
C**  NEW GUESS OF THE COMPOSITION ON THE TRAYS
C**  RESET OF X
C**  CONTROLS NO. OF ITERATIONS
56  IF (KIT.LE.25) GO TO 88
    IF (KIT.LE.30) GO TO 39
    WRITE(6,40)
40  FORMAT (1X,51H KIT EXCEEDED ITERATION LIMIT
1
    WRITE(6,771) (XT(N),N=1,NPI)
771  FORMAT (1X,3HXT=,10F12.8)
    WRITE(6,772) (XTT(N),N=1,NPI)
772  FORMAT (1X,4HXTT=,10F12.8)
    GO TO 66
39  DO 90 N=1,NPI
90  XT(N)=(XT(N)+XTT(N))/2.
88  DO 57 N=1,NPI
57  XTT(N)=XT(N)
C**  THERMODYNAMIC PROPERTIES AT I+1
    CALL PROPER
C**  REFLUX FLOW RATE
    ERX2=SLCC*(XD-XT(NPI))
    SUME=SUME1+(ERX2+ERX1)*DT*30.
    PROP=GAIN*CV*ERX2
    PINT=GAIN*SUME/KINT
    DER=-GAIN*DTD*SLCC*DXT(NPI)/60.
    PC=(AV*PCS+BV*PC1+PROP+PINT+DER)/DV
    LT(NPI)=SQRT(SPG)*ARD*(PC**BRD)
841  FORMAT (1X,9F14.7)
C**  EFFICIENCIES
    CALL EFFICI
C**  CALCULATION OF LIQUID AND VAPOR FLOWS
    CALL FLOWS
C**  DERIVATIVES
    CALL DERIV
    GO TO 46
C**  OUTPUT
66  DI=DI+DT*60.
C**  INITIAL VALUES RESET
    DO 72 N=1,NTT
    DX(N)=DXT(N)
    W(N)=WT(N)
72  HL(N)=HLT(N)
    PC1=PC
    SUME1=SUME
    ERX1=ERX2
    F(1)=STEPF
    SF=STEPS
    XD=STEPXD
27  KIT=0
C**  SETTING UP AUTOLOTTER
    DTOUT=DTOUT+DT*60.
    IF (DTOUT.LE.TOUT) GO TO 28

```



```

IF (DTOUT.LE.TOUT) GO TO 28
DTOUT=DTOUT+DT*60.
**
SETTING UP AUTOPLOTTER
27 KIT=0
XD=STEPXD
ZF=STEPZF
F(1)=STEPF
EX1=EXX2
SUME1=SUME
PCL=PCL
25 F(L(N)=F(L(N)
W(N)=W(N)
EX(N)=DXT(N)
DO 25 N=1,NIT
**
INITIAL VALUES RESET
66 EI=DI+DT*60.
**
OUTPUT
GO TO 46
CALL DERIV
**
DERIVATIVES
CALL FLOW2
**
CALCULATION OF LIQUID AND VAPOR FLOWS
CALL EFFICI
**
EFFICIENCIES
841 FORMAT (1X,9F14.7)
L(T(NP1)=2*RT(2PG)*ARD*(PC**BRD)
PC=(AV*PC2+BV*PCL+PRUP+PINT+DEB)/DV
CLR=-GAIN*CLD*2LCC*DXT(NP1)/60.
PINT=GAIN*SUME\KINT
PRUP=GAIN*CV*EXX2
SUME=SUME1+(EXX2+EXX1)*DT*60.
EXX2=2LCC*(XD-X1(NP1))
**
REFLUX FLOW RATE
CALL PROPE
**
THERMODYNAMIC PROPERTIES AT I+1
27 X1T(N)=X1(N)
88 DO 27 N=1,NP1
90 X1T(N)=(X1(N)+X1T(N))/2.
39 DO 90 N=1,NP1
GO TO 66
272 FORMAT (1X,4HXT=,10F12.8)
WRITE(6,772) (X1T(N),N=1,NP1)
771 FORMAT (1X,3HXT=,10F12.8)
WRITE(6,771) (X1T(N),N=1,NP1)
)
40 FORMAT (1X,51H KIT EXCEEDED ITERATION LIMIT
WRITE(6,40)
IF (KIT.LE.30) GO TO 84
IF (KIT.LE.55) GO TO 88
**
CONTROLS NO. OF ITERATIONS
**
RESET OF X
**
NEW GUESS OF THE COMPOSITION ON THE TRAYS
CO TO 66
25 CONTINUE
IF (ERRX.LT.0.0001) GO TO 26

```

```
      DTOUT=0.0
      WRITE(3,400) DI,(XT(N),N=1,NTT)
C**   CONTROLL OF PRINT OUT
      28 DK=DK+DT*60.
        IF (DK.LE.STEP) GO TO 48
        DK=0.0
      100 CALL TPRINT
C**   CONTROL OF TIME TO FINISH
        IF (DI.GE.TFIN) GO TO 71
        GO TO 48
      71 WRITE(3,401)
      400 FORMAT (1X,F7.2,10F7.4)
      401 FORMAT(6H END  )
      35 CONTINUE
        CALL EXIT
      END
```

```
END  
CALL EXIT  
35 CONTINUE  
401 FORMAT(6H END )  
400 FORMAT (1X,F7.2,10F7.4)  
71 WRITE(3,401)  
GO TO 48  
**  
CONTROL OF TIME TO FINISH  
100 CALL TPRINT  
CK=0.0  
IF (CK.LE.21EP) GO TO 48  
28 CK=CK+01*E.  
**  
CONTROL OF PRINT OUT  
WRITE(3,400) DI,(XT(N),N=1,NIT)  
TOUT=0.0
```


TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 0.00

PLATE	CONCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0114	0.1352	1.1434	73.45	123.05	14.94	0.000003
2	0.0889	0.3542	0.8938	196.50	135.80	3.84	0.000007
3	0.2339	0.6047	0.8255	209.25	154.98	3.75	0.000010
4	0.4139	0.7633	0.9229	228.44	173.49	3.62	0.000008
5	0.5922	0.8458	1.0170	96.45	187.33	3.46	0.000002
6	0.7537	0.8962	0.8278	110.28	197.03	3.30	0.000000
7	0.8440	0.9309	0.7767	119.98	204.06	3.21	-0.000000
8	0.9026	0.9591	0.9212	127.01	210.00	3.15	-0.000001
9	0.9483	0.9776	0.9051	132.96	213.72	3.10	-0.000002
10	0.9776	0.0000	0.0000	136.67	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

136.67	0.0000	150.50	0.5060
--------	--------	--------	--------

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	204.64	219.65	7490.91	112445.77
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TIME = 5.00

PLATE	CONCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0075	0.0915	1.1239	52.13	120.49	14.94	-0.027816
2	0.0637	0.2396	0.8173	172.67	128.53	3.86	-0.260717
3	0.1647	0.5109	0.8760	180.86	146.36	3.80	-0.552302
4	0.3603	0.7225	0.8493	199.03	168.07	3.66	-0.601593
5	0.5556	0.8242	0.9014	88.92	184.02	3.49	-0.666492
6	0.7361	0.8883	0.8144	105.48	196.22	3.32	-0.486971
7	0.8380	0.9279	0.7716	118.16	204.33	3.22	-0.190692
8	0.9003	0.9581	0.9212	126.47	210.86	3.15	-0.080586
9	0.9477	0.9773	0.9051	133.07	214.77	3.10	-0.025593
10	0.9774	0.0000	0.0000	137.01	0.00	2.84	-0.012031

REFLUX	ERROR	FEED	FEED CONC.
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137.01	0.0743	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.44	220.45	7490.91	112445.75
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TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0060	0.0722	1.1239	56.21	119.40	14.95	-0.009229
2	0.0502	0.1952	0.8173	175.63	125.84	3.86	-0.087663
3	0.1341	0.4505	0.8760	182.12	141.62	3.82	-0.236490
4	0.3170	0.6937	0.8493	198.03	164.33	3.69	-0.371585
5	0.5043	0.8007	0.8909	88.74	179.71	3.54	-0.491923
6	0.6993	0.8735	0.8105	104.57	193.02	3.35	-0.361892
7	0.8194	0.9196	0.7716	118.23	202.35	3.24	-0.202856
8	0.8913	0.9543	0.9212	127.77	210.10	3.16	-0.105641
9	0.9441	0.9758	0.9051	135.62	214.59	3.11	-0.046864
10	0.9763	0.0000	0.0000	140.16	0.00	2.84	-0.038586

REFLUX	ERROR	FEED	FEED CONC.
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140.16	0.7380	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.79	220.80	7490.91	112445.75
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0057	0.0684	1.1239	62.46	119.17	14.95	0.002127
2	0.0470	0.1842	0.8173	181.63	125.19	3.87	0.003529
3	0.1250	0.4322	0.8760	187.64	140.24	3.82	-0.000975
4	0.3010	0.6829	0.8493	202.70	163.10	3.71	-0.032436
5	0.4795	0.7898	0.8909	93.28	177.81	3.56	-0.110523
6	0.6793	0.8657	0.8105	108.09	191.39	3.37	-0.119538
7	0.8076	0.9147	0.7716	121.78	201.19	3.25	-0.075345
8	0.8850	0.9517	0.9212	131.66	209.58	3.17	-0.041455
9	0.9412	0.9745	0.9051	140.09	214.42	3.11	-0.020945
10	0.9749	0.0000	0.0000	144.95	0.00	2.84	-0.024848

REFLUX	ERROR	FEED	FEED CONC.
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144.95	1.5473	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.85	220.86	7490.91	112445.75
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TIME = 10.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
2	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
3	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
4	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
5	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
6	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
7	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
8	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
9	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
10	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000

REFLUX ERROR FEED FEED CONC.

140.16 0.1381 135.30 0.2060

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

116.50 505.79 550.80 1490.91 11544.75

TIME = 15.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
2	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
3	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
4	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
5	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
6	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
7	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
8	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
9	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000
10	0.0000	0.0000	1.1539	0.0000	119.40	14.91	-0.000000

REFLUX ERROR FEED FEED CONC.

144.25 1.2473 135.30 0.2060

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

116.50 505.82 550.80 1490.91 11544.75

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0062	0.0729	1.1239	67.18	119.44	14.95	0.007934
2	0.0495	0.1945	0.8173	186.60	125.81	3.86	0.052928
3	0.1307	0.4450	0.8760	192.94	141.19	3.82	0.129226
4	0.3076	0.6886	0.8493	208.25	163.75	3.70	0.171249
5	0.4842	0.7922	0.8909	98.37	178.26	3.56	0.178137
6	0.6798	0.8660	0.8105	112.74	191.48	3.37	0.114041
7	0.8070	0.9144	0.7716	125.85	201.16	3.25	0.054053
8	0.8845	0.9515	0.9212	135.47	209.57	3.17	0.026780
9	0.9408	0.9744	0.9051	143.86	214.42	3.11	0.010574
10	0.9744	0.0000	0.0000	148.69	0.00	2.84	0.001335

REFLUX ERROR FEED FEED CONC.

148.69 1.8337 132.30 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.75	220.76	7490.91	112445.75
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0069	0.0815	1.1239	69.28	119.93	14.94	0.010063
2	0.0550	0.2157	0.8173	189.18	127.09	3.86	0.073988
3	0.1443	0.4726	0.8760	196.31	143.27	3.81	0.186145
4	0.3264	0.7010	0.8493	212.38	165.23	3.69	0.262729
5	0.5047	0.8012	0.8909	101.83	179.82	3.54	0.296646
6	0.6934	0.8713	0.8105	116.15	192.60	3.36	0.200089
7	0.8143	0.9175	0.7716	128.74	201.88	3.24	0.111297
8	0.8884	0.9531	0.9212	137.90	209.89	3.17	0.061236
9	0.9426	0.9751	0.9051	145.85	214.52	3.11	0.028978
10	0.9749	0.0000	0.0000	150.45	0.00	2.84	0.020695

REFLUX ERROR FEED FEED CONC.

150.45 1.5485 132.30 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.58	220.59	7490.91	112445.75
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TABLE II - CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
2	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
3	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
4	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
5	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
6	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
7	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
8	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
9	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
10	0.0000	0.0000	0.0000	148.89	0.00	2.84	0.001335
REFLUX	148.69	1.8337	132.30	0.2000			
FEED							
FEED CONC.							
STEAM							
REBOILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TIME = 52.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
2	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
3	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
4	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
5	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
6	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
7	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
8	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
9	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
10	0.0000	0.0000	0.0000	150.45	0.00	2.84	0.001335
REFLUX	150.45	1.2484	132.30	0.2000			
FEED							
FEED CONC.							
STEAM							
REBOILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0078	0.0918	1.1239	69.10	120.51	14.94	0.009656
2	0.0619	0.2363	0.8173	189.59	128.34	3.86	0.076483
3	0.1586	0.5012	0.8760	197.38	145.50	3.80	0.155699
4	0.3473	0.7149	0.8493	214.44	167.05	3.67	0.229879
5	0.5295	0.8118	0.8909	103.51	181.77	3.51	0.286070
6	0.7105	0.8780	0.8105	117.97	194.05	3.34	0.198696
7	0.8240	0.9216	0.7716	130.05	202.88	3.23	0.113669
8	0.8937	0.9554	0.9212	138.76	210.37	3.16	0.063438
9	0.9452	0.9762	0.9051	146.19	214.72	3.11	0.031175
10	0.9759	0.0000	0.0000	150.50	0.00	2.84	0.026570

REFLUX	ERROR	FEED	FEED CONC.
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150.50	0.9642	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.38	220.40	7490.91	112445.75
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0084	0.0996	1.1256	67.67	120.96	14.94	0.003506
2	0.0671	0.2536	0.8223	188.62	129.39	3.85	0.040859
3	0.1705	0.5209	0.8734	197.03	147.18	3.79	0.121170
4	0.3627	0.7257	0.8515	214.74	168.47	3.66	0.129618
5	0.5498	0.8208	0.8909	103.63	183.43	3.50	0.202316
6	0.7253	0.8838	0.8105	118.40	195.29	3.33	0.151365
7	0.8325	0.9253	0.7716	130.12	203.76	3.22	0.087293
8	0.8986	0.9574	0.9212	138.49	210.77	3.15	0.051586
9	0.9476	0.9773	0.9051	145.45	214.87	3.10	0.025818
10	0.9770	0.0000	0.0000	149.52	0.00	2.84	0.023767

REFLUX	ERROR	FEED	FEED CONC.
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149.52	0.3530	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.26	220.27	7490.91	112445.77
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TABLE 1 - CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1239	0.0000	150.20	0.00	0.0000
2	0.0000	0.0000	0.8173	180.29	158.34	3.00	0.0000
3	0.0000	0.0000	0.8760	197.38	147.20	3.00	0.0000
4	0.0000	0.0000	0.8493	214.44	167.02	3.00	0.0000
5	0.0000	0.0000	0.8909	103.21	181.37	3.00	0.0000
6	0.0000	0.0000	0.8102	117.97	194.00	3.00	0.0000
7	0.0000	0.0000	0.7716	130.12	202.30	3.00	0.0000
8	0.0000	0.0000	0.9212	138.49	210.77	3.00	0.0000
9	0.0000	0.0000	0.9021	147.42	214.87	3.00	0.0000
10	0.0000	0.0000	0.9021	147.42	214.87	3.00	0.0000
REFLUX	150.20	0.0000	132.30	0.2000			
STEAM							
FLW	116.20	202.26	250.27	1490.21	11242.77		

TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1256	0.0000	150.20	0.00	0.0000
2	0.0000	0.0000	0.8223	188.62	159.39	3.00	0.0000
3	0.0000	0.0000	0.8784	197.03	147.18	3.00	0.0000
4	0.0000	0.0000	0.8612	214.74	168.47	3.00	0.0000
5	0.0000	0.0000	0.8909	103.63	187.47	3.00	0.0000
6	0.0000	0.0000	0.8102	118.40	197.29	3.00	0.0000
7	0.0000	0.0000	0.7716	130.12	202.30	3.00	0.0000
8	0.0000	0.0000	0.9212	138.49	210.77	3.00	0.0000
9	0.0000	0.0000	0.9021	147.42	214.87	3.00	0.0000
10	0.0000	0.0000	0.9021	147.42	214.87	3.00	0.0000
REFLUX	142.22	0.0000	132.30	0.2000			
STEAM							
FLW	116.20	202.26	250.27	1490.21	11242.77		

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0085	0.1020	1.1266	65.84	121.10	14.94	-0.000228
2	0.0691	0.2616	0.8287	186.94	129.89	3.85	0.005142
3	0.1765	0.5295	0.8688	195.73	147.93	3.79	0.021805
4	0.3695	0.7317	0.8610	213.75	169.34	3.65	0.033137
5	0.5614	0.8284	0.9199	102.84	184.81	3.49	0.081814
6	0.7373	0.8887	0.8153	118.23	196.32	3.32	0.100466
7	0.8393	0.9283	0.7727	129.64	204.44	3.22	0.067369
8	0.9025	0.9590	0.9212	137.70	211.04	3.15	0.041769
9	0.9495	0.9780	0.9000	144.25	214.92	3.10	0.019909
10	0.9778	0.0000	0.0000	148.11	0.00	2.83	0.018188

REFLUX	ERROR	FEED	FEED CONC.
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148.11	-0.1224	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.22	220.23	7490.91	112445.75
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0086	0.1029	1.1270	65.44	121.15	14.94	-0.000055
2	0.0699	0.2647	0.8313	186.59	130.08	3.85	0.004401
3	0.1791	0.5330	0.8669	195.52	148.23	3.79	0.017998
4	0.3728	0.7341	0.8655	213.65	169.73	3.65	0.026803
5	0.5679	0.8321	0.9402	102.83	185.58	3.48	0.054983
6	0.7450	0.8920	0.8212	118.64	197.10	3.31	0.069697
7	0.8451	0.9310	0.7767	130.09	205.17	3.21	0.049568
8	0.9070	0.9588	0.8278	138.10	210.98	3.15	0.029845
9	0.9495	0.9780	0.9000	143.88	214.89	3.10	0.014070
10	0.9779	0.0000	0.0000	147.78	0.00	2.83	0.009805

REFLUX	ERROR	FEED	FEED CONC.
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147.78	-0.1706	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.21	220.22	7490.91	112445.77
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TABLE 1 - CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 40.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1586	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

148.11 -0.1554 135.30 0.2080

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

116.50 505.55 550.53 7490.91 11545.75

TIME = 45.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1570	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.8887	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

147.78 -0.1706 135.30 0.2080

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

116.50 505.51 550.53 7490.91 11545.75

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0085	0.1016	1.1262	63.75	121.07	14.94	-0.003043
2	0.0692	0.2615	0.8291	184.83	129.88	3.85	-0.019003
3	0.1776	0.5306	0.8681	193.65	148.03	3.79	-0.051301
4	0.3719	0.7334	0.8643	211.83	169.64	3.65	-0.045579
5	0.5687	0.8326	0.9430	101.18	185.70	3.48	-0.032867
6	0.7475	0.8930	0.8231	117.27	197.36	3.31	-0.010023
7	0.8473	0.9319	0.7767	128.94	205.44	3.21	0.002427
8	0.9084	0.9595	0.8278	137.01	211.15	3.14	0.004678
9	0.9502	0.9783	0.9000	142.72	214.98	3.10	0.003911
10	0.9783	0.0000	0.0000	146.55	0.00	2.83	0.006050

REFLUX ERROR FEED FEED CONC.

146.55 -0.3902 132.30 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.24	220.25	7490.91	112445.77
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0082	0.0981	1.1245	62.68	120.87	14.94	-0.003007
2	0.0671	0.2524	0.8223	183.56	129.31	3.85	-0.027255
3	0.1719	0.5223	0.8724	192.02	147.31	3.79	-0.076630
4	0.3667	0.7285	0.8570	210.07	168.96	3.65	-0.073642
5	0.5627	0.8290	0.9239	99.47	185.06	3.48	-0.099617
6	0.7436	0.8913	0.8201	115.66	197.03	3.31	-0.076339
7	0.8457	0.9312	0.7767	127.71	205.31	3.21	-0.037905
8	0.9078	0.9592	0.8278	136.03	211.15	3.14	-0.017979
9	0.9501	0.9783	0.9000	141.88	215.04	3.10	-0.007324
10	0.9783	0.0000	0.0000	145.78	0.00	2.83	-0.003571

REFLUX ERROR FEED FEED CONC.

145.78 -0.4211 132.30 0.5060

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.30	220.31	7490.91	112445.75
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TABLE 1 - CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
2	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
3	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
4	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
5	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
6	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
7	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
8	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
9	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
10	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
REFLUX	ERROR	FEED	FEED CONC.	135.30	0.2000		
STEAM	TEMPERATURE						
FLW	REBOILER	STEAM	COEFFICIENT	HEAT LOAD			
116.20	502.24	550.22	1490.91	11545.75			

TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
2	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
3	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
4	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
5	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
6	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
7	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
8	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
9	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
10	0.0000	0.0000	0.0000	145.25	0.00	0.00	0.000000
REFLUX	ERROR	FEED	FEED CONC.	135.30	0.2000		
STEAM	TEMPERATURE						
FLW	REBOILER	STEAM	COEFFICIENT	HEAT LOAD			
116.20	502.30	550.31	1490.91	11545.75			

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0080	0.0951	1.1239	62.77	120.70	14.94	-0.002301
2	0.0651	0.2445	0.8173	183.47	128.83	3.86	-0.020795
3	0.1664	0.5142	0.8760	191.61	146.62	3.80	-0.042760
4	0.3611	0.7233	0.8493	209.43	168.24	3.66	-0.053583
5	0.5546	0.8234	0.8983	98.79	184.03	3.49	-0.082446
6	0.7360	0.8879	0.8143	114.66	196.34	3.32	-0.096215
7	0.8417	0.9293	0.7747	127.06	204.89	3.21	-0.054769
8	0.9057	0.9583	0.8278	135.67	211.00	3.15	-0.030999
9	0.9492	0.9779	0.9000	141.81	215.03	3.10	-0.014373
10	0.9780	0.0000	0.0000	145.86	0.00	2.83	-0.010832

REFLUX ERROR FEED FEED CONC.

145.86 -0.2429 132.30 0.5060

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

116.50 205.35 220.36 7490.91 112445.77

TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0079	0.0941	1.1239	63.82	120.64	14.94	0.000432
2	0.0643	0.2422	0.8173	184.46	128.69	3.86	0.000103
3	0.1646	0.5112	0.8760	192.51	146.36	3.80	-0.002361
4	0.3584	0.7216	0.8493	210.18	167.98	3.66	-0.009584
5	0.5501	0.8207	0.8909	99.51	183.50	3.50	-0.028550
6	0.7304	0.8856	0.8105	115.05	195.79	3.32	-0.035234
7	0.8380	0.9275	0.7716	127.38	204.43	3.22	-0.027639
8	0.9034	0.9572	0.8278	136.05	210.75	3.15	-0.020803
9	0.9479	0.9774	0.9051	142.39	214.93	3.10	-0.011814
10	0.9775	0.0000	0.0000	146.58	0.00	2.83	-0.009918

REFLUX ERROR FEED FEED CONC.

146.58 0.0182 132.30 0.5060

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

116.50 205.36 220.37 7490.91 112445.77

TIME = 41.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOUR	HOLD-UP	DERIVATIVE
1	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
2	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
3	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
4	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
5	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
6	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
7	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
8	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
9	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433
10	0.0080	0.0000	0.0000	145.88	0.00	5.88 -0.01433

REFLUX FLOW REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

145.88 -0.2429 135.30 0.2080

116.50 505.35 525.35 11544.11

TIME = 62.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOUR	HOLD-UP	DERIVATIVE
1	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
2	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
3	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
4	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
5	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
6	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
7	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
8	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
9	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433
10	0.0079	0.0000	0.0000	145.88	0.00	5.88 -0.01433

REFLUX FLOW REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

145.88 -0.0185 135.30 0.2080

116.50 505.35 525.35 11544.11

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0078	0.0926	1.1239	63.10	120.56	14.94	-0.002361
2	0.0632	0.2392	0.8173	183.66	128.51	3.86	-0.019344
3	0.1624	0.5075	0.8760	191.62	146.05	3.80	-0.040003
4	0.3555	0.7197	0.8493	209.19	167.71	3.66	-0.052433
5	0.5458	0.8188	0.8909	98.59	183.08	3.50	-0.069865
6	0.7262	0.8840	0.8105	114.03	195.38	3.33	-0.057572
7	0.8345	0.9261	0.7716	126.38	204.01	3.22	-0.035260
8	0.9004	0.9581	0.9212	135.05	210.98	3.15	-0.020160
9	0.9488	0.9777	0.9000	142.04	215.00	3.10	-0.007499
10	0.9777	0.0000	0.0000	146.07	0.00	2.83	-0.002207

REFLUX	ERROR	FEED	FEED CONC.
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146.07	-0.0966	132.30	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.39	220.40	7490.91	112445.75
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0076	0.0909	1.1239	63.56	120.46	14.94	-0.000969
2	0.0621	0.2358	0.8173	184.02	128.30	3.86	-0.009100
3	0.1600	0.5030	0.8760	191.86	145.66	3.80	-0.019576
4	0.3519	0.7173	0.8493	209.24	167.39	3.67	-0.031522
5	0.5410	0.8166	0.8909	98.69	182.67	3.50	-0.044818
6	0.7222	0.8825	0.8105	114.01	195.04	3.33	-0.037402
7	0.8322	0.9251	0.7716	126.42	203.75	3.22	-0.023163
8	0.8990	0.9575	0.9212	135.15	210.85	3.15	-0.014725
9	0.9481	0.9775	0.9051	142.26	214.97	3.10	-0.007664
10	0.9776	0.0000	0.0000	146.39	0.00	2.83	-0.004235

REFLUX	ERROR	FEED	FEED CONC.
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146.39	0.0116	132.30	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.42	220.43	7490.91	112445.77
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TABLE 1 - CLOSURE LOOP - STEP IN FEED FLOW - RUN 1

TIME = 70.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
REFLUX	ERROR	FEED	FEED CONC.					
10	0.9177	0.0000	0.0000	148.07	0.00	2.88	-0.002507	
9	0.9481	0.9777	0.9000	145.04	215.00	8.1	-0.007449	
8	0.9004	0.9281	0.9212	132.62	216.70	8.12	-0.002180	
7	0.8342	0.9261	0.7716	130.38	204.01	8.22	-0.032260	
6	0.7262	0.8840	0.8102	114.00	192.38	8.33	-0.074025	
5	0.5428	0.8188	0.8009	98.00	183.01	8.50	-0.064818	
4	0.3222	0.7173	0.8493	80.34	167.33	8.67	-0.031225	
3	0.1624	0.5232	0.8760	191.86	142.66	8.80	-0.012278	
2	0.0621	0.2328	0.8173	184.72	128.30	8.92	-0.002100	
1	0.0078	0.0429	1.1239	82.28	120.48	14.94	-0.000989	

TIME = 75.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
REFLUX	ERROR	FEED	FEED CONC.					
10	0.9776	0.0000	0.0000	148.39	0.00	8.87	-0.007777	
9	0.9481	0.9772	0.9021	145.26	214.97	8.10	-0.007669	
8	0.8896	0.9278	0.9212	132.17	210.82	8.12	-0.014722	
7	0.8322	0.9261	0.7716	126.42	203.72	8.22	-0.023163	
6	0.7272	0.8822	0.8102	114.01	192.04	8.33	-0.073402	
5	0.5410	0.8166	0.8009	98.00	182.67	8.50	-0.044818	
4	0.3219	0.7173	0.8493	80.34	167.33	8.67	-0.031225	
3	0.1606	0.5232	0.8760	191.86	142.66	8.80	-0.012278	
2	0.0621	0.2328	0.8173	184.72	128.30	8.92	-0.002100	
1	0.0078	0.0429	1.1239	82.28	120.48	14.94	-0.000989	

TABLE U-9 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0076	0.0907	1.1239	64.22	120.45	14.94	0.000546
2	0.0618	0.2351	0.8173	184.67	128.26	3.86	0.002432
3	0.1593	0.5018	0.8760	192.48	145.56	3.80	0.003495
4	0.3507	0.7166	0.8493	209.78	167.29	3.67	0.001486
5	0.5388	0.8156	0.8909	99.21	182.49	3.51	-0.006162
6	0.7202	0.8817	0.8105	114.41	194.87	3.33	-0.009903
7	0.8309	0.9245	0.7716	126.80	203.61	3.22	-0.007652
8	0.8982	0.9572	0.9212	135.55	210.77	3.15	-0.005191
9	0.9477	0.9773	0.9051	142.72	214.93	3.10	-0.002967
10	0.9774	0.0000	0.0000	146.88	0.00	2.84	-0.003501

REFLUX	ERROR	FEED	FEED CONC.
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146.88	0.1209	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.42	220.43	7490.91	112445.77
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TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0077	0.0915	1.1239	64.73	120.50	14.94	0.001318
2	0.0623	0.2368	0.8173	185.22	128.36	3.86	0.009177
3	0.1603	0.5038	0.8760	193.08	145.73	3.80	0.017707
4	0.3519	0.7174	0.8493	210.44	167.40	3.67	0.023680
5	0.5397	0.8160	0.8909	99.79	182.56	3.51	0.023591
6	0.7204	0.8818	0.8105	114.93	194.88	3.33	0.013391
7	0.8308	0.9245	0.7716	127.24	203.60	3.22	0.005817
8	0.8981	0.9572	0.9212	135.95	210.76	3.15	0.002678
9	0.9476	0.9773	0.9051	143.10	214.92	3.10	0.000848
10	0.9773	0.0000	0.0000	147.26	0.00	2.84	-0.000177

REFLUX	ERROR	FEED	FEED CONC.
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147.26	0.1649	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.40	220.42	7490.91	112445.75
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TABLE 1 - CLOSURE STEP IN FEED FLOW - RUN 1

TIME = 80.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

146.88 0.1509 135.30 0.2060

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

116.50 502.45 550.48 1490.91 115449.77

TIME = 82.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

147.56 0.1649 135.30 0.2060

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

116.50 502.40 550.48 1490.91 115449.77

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0093	0.0922	1.0907	64.43	122.09	14.94	0.000002
2	0.0635	0.2528	0.8520	186.53	130.76	3.86	0.000004
3	0.1724	0.5188	0.8609	195.19	148.35	3.79	0.000009
4	0.3645	0.7234	0.8336	212.78	169.44	3.66	0.000009
5	0.5535	0.8230	0.8981	101.58	184.87	3.49	0.000002
6	0.7333	0.8884	0.8430	117.01	197.01	3.32	0.000002
7	0.8415	0.9288	0.7630	129.15	204.94	3.21	-0.000000
8	0.9047	0.9584	0.8554	137.07	210.81	3.15	-0.000001
9	0.9493	0.9776	0.8731	142.95	214.23	3.10	-0.000000
10	0.9776	0.0000	0.0000	146.36	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
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146.36	0.1649	132.30	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	205.05	219.89	7709.41	114376.18
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0152	0.1386	1.0907	85.92	124.06	14.93	0.063468
2	0.0927	0.3533	0.8677	209.86	136.37	3.84	0.331434
3	0.2328	0.6061	0.8348	221.99	155.71	3.75	0.584261
4	0.4150	0.7636	0.9201	240.94	173.91	3.61	0.564333
5	0.5926	0.8450	1.0003	108.15	187.38	3.46	0.550364
6	0.7533	0.8975	0.8630	121.12	197.20	3.30	0.355512
7	0.8484	0.9334	0.8019	130.59	204.24	3.21	0.171494
8	0.9083	0.9604	0.8716	137.46	209.73	3.14	0.088942
9	0.9509	0.9783	0.8731	142.85	212.38	3.10	0.037362
10	0.9780	0.0000	0.0000	145.46	0.00	2.83	0.024323

REFLUX	ERROR	FEED	FEED CONC.
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145.46	-0.2096	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.91	218.74	7709.41	114376.18
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TABLE U-1 CLOSED LOOP - STEP IN FEED FLOW - IN 5

TIME = 2.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9178	0.0000	0.0000	148.38	0.00	5.83	-0.00001
9	0.9423	0.0716	0.8731	148.97	214.53	3.11	-0.00000
8	0.9047	0.0284	0.8224	137.07	210.81	3.12	-0.00001
7	0.8418	0.0288	0.7638	129.12	204.94	3.21	-0.00000
6	0.7333	0.8884	0.8430	117.01	197.01	3.32	-0.00001
5	0.5218	0.8230	0.8981	101.28	184.28	3.49	-0.00003
4	0.3648	0.7234	0.8838	517.78	189.44	3.66	-0.00001
3	0.1734	0.2184	0.8600	144.19	148.38	3.79	-0.00003
2	0.0632	0.2228	0.9220	189.28	130.78	3.88	-0.00004
1	0.0078	0.0222	1.0007	14.78	122.09	14.24	-0.00003
REFLUX	146.36	0.1649	132.30	0.2080			
STEAM FLOW	118.20	202.02	219.89	2709.41	114376.18		
TEMPERATURE							
REBOILER							
COEFFICIENT							
HEAT LOAD							

TIME = 2.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9180	0.0000	0.0000	142.46	0.00	5.83	-0.02433
9	0.9202	0.0713	0.8731	142.94	213.38	3.11	-0.00003
8	0.9088	0.0604	0.8716	137.66	207.72	3.14	-0.00003
7	0.8484	0.0334	0.8019	130.22	204.24	3.21	-0.011494
6	0.7233	0.8472	0.8630	121.12	197.20	3.32	-0.022012
5	0.5228	0.8440	1.0003	108.12	187.39	3.49	-0.000004
4	0.4120	0.7616	0.9201	240.94	173.21	3.61	-0.004331
3	0.2328	0.6061	0.8348	221.22	122.71	3.77	-0.084261
2	0.0627	0.2223	0.8677	209.28	124.37	3.84	-0.031924
1	0.0122	0.1386	1.0007	22.78	124.08	14.22	-0.083468
REFLUX	142.46	-0.2096	120.20	0.2060			
STEAM FLOW	118.20	203.91	218.74	2709.41	114376.18		
TEMPERATURE							
REBOILER							
COEFFICIENT							
HEAT LOAD							

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0198	0.1746	1.0907	81.76	125.59	14.92	0.041872
2	0.1166	0.4117	0.8677	207.27	139.74	3.83	0.217594
3	0.2738	0.6550	0.8348	221.29	160.67	3.73	0.376614
4	0.4531	0.7818	0.9201	241.95	176.35	3.58	0.337422
5	0.6288	0.8584	1.0023	106.84	189.50	3.42	0.312138
6	0.7758	0.9064	0.8635	119.69	198.71	3.28	0.194845
7	0.8609	0.9389	0.8019	128.71	205.26	3.19	0.113122
8	0.9150	0.9633	0.8716	135.14	210.69	3.14	0.063924
9	0.9540	0.9796	0.8731	140.50	212.14	3.10	0.031911
10	0.9792	0.0000	0.0000	141.92	0.00	2.83	0.030677

REFLUX ERROR FEED FEED CONC.

141.92 -0.9361 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.03	217.86	7709.41	114376.16
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0221	0.1924	1.0907	76.85	126.35	14.91	0.012631
2	0.1289	0.4405	0.8677	203.18	141.50	3.82	0.076453
3	0.2955	0.6755	0.8348	218.28	162.60	3.71	0.120018
4	0.4698	0.7896	0.9201	239.29	177.29	3.57	0.091703
5	0.6451	0.8643	1.0023	103.40	190.33	3.41	0.093706
6	0.7864	0.9106	0.8635	116.35	199.30	3.27	0.062023
7	0.8671	0.9416	0.8019	125.26	205.67	3.19	0.038250
8	0.9186	0.9648	0.8716	131.59	211.11	3.13	0.022545
9	0.9559	0.9804	0.8731	137.00	211.88	3.09	0.012433
10	0.9802	0.0000	0.0000	137.76	0.00	2.83	0.016061

REFLUX ERROR FEED FEED CONC.

137.76 -1.5102 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	202.67	217.50	7709.41	114376.18
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TABLE U-1 CLOSED LOOP - STEP IN FEED FLOW - RUN 5

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9795	0.0000	0.0000	141.95	0.00	5.83	0.030973
9	0.9540	0.9798	0.8731	140.50	212.14	4.14	0.031911
8	0.9150	0.9633	0.8716	132.14	210.69	4.14	0.033354
7	0.8609	0.9199	0.8719	128.71	202.30	3.19	0.113155
6	0.7728	0.9064	0.8632	119.69	198.71	1.28	0.194842
5	0.6538	0.7594	1.0023	106.84	189.70	8.45	0.315138
4	0.4231	0.7818	0.9201	241.22	176.37	8.29	0.337455
3	0.2734	0.7427	0.8843	251.29	160.67	8.73	0.370614
2	0.1166	0.4117	0.8677	267.27	139.79	4.74	0.517204
1	0.0199	0.1746	1.0907	81.74	122.29	14.95	0.041875
REFLUX	ERROR	FEED	FEED CONC.				
141.95	-0.9361	120.25	0.2060				
STEAM	TEMPERATURE						
FLCW	REBOILER	STEAM					
118.20	203.03	217.86	1709.41	11436.18			

TIME = 12.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9805	0.0000	0.0000	137.76	0.00	5.83	0.016661
9	0.9599	0.9804	0.8731	137.00	211.88	3.09	0.015433
8	0.9186	0.9648	0.8716	131.29	211.11	3.13	0.025942
7	0.8671	0.9416	0.8019	122.28	202.67	4.19	0.038220
6	0.7864	0.9106	0.8632	119.32	199.30	3.27	0.062023
5	0.6451	0.8643	1.0023	103.40	190.44	4.41	0.093706
4	0.4698	0.7896	0.9201	239.29	177.27	3.27	0.091703
3	0.2522	0.6767	0.8348	218.28	162.64	3.71	0.120018
2	0.1289	0.4402	0.8677	203.18	141.20	4.87	0.076453
1	0.0221	0.1924	1.0907	76.82	126.48	14.91	0.012621
REFLUX	ERROR	FEED	FEED CONC.				
137.76	-1.2102	100.25	0.2060				
STEAM	TEMPERATURE						
FLCW	REBOILER	STEAM					
118.20	202.67	217.86	1709.41	11436.18			

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0220	0.1919	1.0907	72.69	126.34	14.91	-0.013679
2	0.1288	0.4401	0.8677	199.06	141.50	3.82	-0.071895
3	0.2959	0.6759	0.8348	214.26	162.63	3.71	-0.098094
4	0.4702	0.7897	0.9201	235.46	177.24	3.57	-0.073313
5	0.6460	0.8646	1.0023	99.63	190.30	3.41	-0.062879
6	0.7872	0.9109	0.8635	112.75	199.28	3.27	-0.035420
7	0.8677	0.9418	0.8019	121.77	205.65	3.19	-0.021301
8	0.9189	0.9649	0.8716	128.16	211.08	3.13	-0.013422
9	0.9561	0.9805	0.8731	133.60	211.78	3.09	-0.006604
10	0.9805	0.0000	0.0000	134.31	0.00	2.83	-0.001089

REFLUX ERROR FEED FEED CONC.

134.31 -1.6871 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	202.68	217.51	7709.41	114376.16
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0202	0.1779	1.0907	69.94	125.75	14.92	-0.027022
2	0.1194	0.4177	0.8677	195.74	140.15	3.82	-0.144604
3	0.2807	0.6615	0.8348	210.23	161.27	3.72	-0.247421
4	0.4590	0.7845	0.9201	231.52	176.57	3.58	-0.181477
5	0.6362	0.8611	1.0023	96.47	189.78	3.42	-0.162293
6	0.7814	0.9086	0.8635	109.84	198.94	3.27	-0.099317
7	0.8642	0.9403	0.8019	119.10	205.40	3.19	-0.060266
8	0.9167	0.9640	0.8716	125.62	210.78	3.14	-0.037304
9	0.9549	0.9800	0.8731	131.04	211.90	3.10	-0.019752
10	0.9802	0.0000	0.0000	132.18	0.00	2.83	-0.014229

REFLUX ERROR FEED FEED CONC.

132.18 -1.4954 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	202.97	217.80	7709.41	114376.18
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TABLE 11-17 CLOSED LOOP - STEP IN FEED FLOW - UN 5

TIME = 20.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR H/L-UP DERIVATIVE

1	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
2	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
3	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
4	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
5	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
6	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
7	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
8	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
9	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000
10	0.0000	0.0000	0.0000	134.31	0.00	134.31	0.000000	0.000000

REFLUX ERROR FEED FEED CONC.

134.31 -1.6871 130.50 0.2080

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

118.50 505.68 515.51 1709.41 114376.16

TIME = 25.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR H/L-UP DERIVATIVE

1	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
2	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
3	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
4	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
5	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
6	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
7	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
8	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
9	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000
10	0.0000	0.0000	0.0000	135.18	0.00	135.18	0.000000	0.000000

REFLUX ERROR FEED FEED CONC.

135.18 -1.4924 130.50 0.2080

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

118.50 505.68 517.80 1709.41 114376.16

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 30.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0178	0.1588	1.0907	68.78	124.95	14.92	-0.028918
2	0.1065	0.3861	0.8677	193.78	138.28	3.83	-0.155660
3	0.2587	0.6372	0.8348	207.20	158.87	3.74	-0.267720
4	0.4407	0.7758	0.9201	227.99	175.53	3.59	-0.239445
5	0.6201	0.8552	1.0023	94.36	188.99	3.43	-0.216224
6	0.7716	0.9047	0.8635	108.02	198.45	3.28	-0.132388
7	0.8582	0.9377	0.8019	117.61	205.06	3.20	-0.079710
8	0.9131	0.9624	0.8716	124.31	210.39	3.14	-0.048749
9	0.9530	0.9791	0.8731	129.68	212.20	3.10	-0.026034
10	0.9794	0.0000	0.0000	131.52	0.00	2.83	-0.021544

REFLUX	ERROR	FEED	FEED CONC.
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131.52	-1.0586	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.42	218.25	7709.41	114376.16
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0156	0.1415	1.0907	69.33	124.20	14.93	-0.022983
2	0.0946	0.3571	0.8677	193.58	136.64	3.84	-0.124326
3	0.2381	0.6130	0.8348	206.08	156.45	3.75	-0.209786
4	0.4222	0.7670	0.9201	226.03	174.42	3.61	-0.206054
5	0.6027	0.8488	1.0023	93.68	188.03	3.45	-0.190051
6	0.7607	0.9004	0.8635	107.48	197.78	3.29	-0.122284
7	0.8516	0.9349	0.8019	117.34	204.56	3.20	-0.075262
8	0.9090	0.9607	0.8716	124.20	209.82	3.14	-0.046184
9	0.9508	0.9782	0.8731	129.51	212.39	3.10	-0.024909
10	0.9785	0.0000	0.0000	132.11	0.00	2.83	-0.022419

REFLUX	ERROR	FEED	FEED CONC.
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132.11	-0.5225	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.84	218.67	7709.41	114376.18
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TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 11.41

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9794	0.0000	0.0000	131.25	0.00	2.88	-0.01244
9	0.9230	0.9791	0.8781	129.68	212.74	4.10	-0.02634
8	0.9141	0.9448	0.8716	124.31	210.39	4.14	-0.04849
7	0.8483	0.9317	0.8019	117.61	202.06	4.20	-0.07911
6	0.7116	0.9047	0.7077	108.02	188.47	4.24	-0.13544
5	0.6501	0.8222	1.4423	94.36	188.49	3.43	-0.21624
4	0.4407	0.7128	0.9901	527.99	172.23	4.29	-0.38348
3	0.2947	0.6312	0.8348	207.77	126.97	3.74	-0.26171
2	0.1067	0.1841	0.1847	103.78	136.28	3.82	-0.12264
1	0.0178	0.1244	1.0007	68.74	124.25	14.92	-0.02841
REFLUX	-1.0231	120.20	0.2060				
FEED							
FEED CONC.							
STEAM							
REBCILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
118.20	503.84	118.22	1709.41	114376.16			

TIME = 32.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9792	0.0000	0.0000	132.11	0.00	2.88	-0.02849
9	0.9230	0.9782	0.8781	129.21	212.39	3.10	-0.02409
8	0.9090	0.9607	0.8716	124.70	210.75	3.14	-0.04618
7	0.8216	0.9349	0.8019	117.34	204.20	4.20	-0.07262
6	0.7007	0.9044	0.7077	107.48	197.78	4.29	-0.12284
5	0.6027	0.8488	1.0023	93.68	188.62	3.42	-0.19002
4	0.4222	0.7670	0.9201	426.03	174.67	3.61	-0.26624
3	0.2381	0.6130	0.8348	206.08	124.44	3.77	-0.20978
2	0.0744	0.3271	0.8677	103.78	136.64	3.84	-0.12436
1	0.0126	0.1412	1.0007	64.33	124.70	14.92	-0.02283
REFLUX	-0.2222	120.20	0.2060				
FEED							
FEED CONC.							
STEAM							
REBCILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
118.20	503.84	118.67	1709.41	114376.1			

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0142	0.1306	1.0907	70.62	123.73	14.93	-0.011078
2	0.0875	0.3363	0.8655	194.37	135.46	3.84	-0.056679
3	0.2240	0.5942	0.8380	206.13	154.57	3.76	-0.133668
4	0.4082	0.7590	0.9102	225.33	173.40	3.62	-0.124031
5	0.5885	0.8429	0.9897	93.77	187.06	3.46	-0.149252
6	0.7514	0.8967	0.8611	107.57	197.11	3.30	-0.112017
7	0.8460	0.9323	0.7958	117.72	204.02	3.21	-0.060048
8	0.9056	0.9592	0.8670	124.69	209.24	3.15	-0.043796
9	0.9489	0.9775	0.8859	129.96	212.53	3.10	-0.031524
10	0.9777	0.0000	0.0000	133.29	0.00	2.83	-0.010908

REFLUX	ERROR	FEED	FEED CONC.
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133.29	-0.0633	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.10	218.94	7709.41	114376.18
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0138	0.1274	1.0907	73.17	123.59	14.93	0.001578
2	0.0853	0.3291	0.8642	196.76	135.04	3.84	0.005980
3	0.2185	0.5872	0.8405	208.20	153.87	3.76	0.007011
4	0.4028	0.7553	0.9006	227.02	172.89	3.63	-0.000506
5	0.5809	0.8390	0.9697	95.55	186.36	3.47	-0.022191
6	0.7448	0.8938	0.8545	109.03	196.50	3.31	-0.033376
7	0.8422	0.9297	0.7680	119.21	203.35	3.21	-0.026124
8	0.9022	0.9575	0.8554	126.09	208.50	3.15	-0.028028
9	0.9468	0.9767	0.8859	131.27	212.53	3.10	-0.016027
10	0.9769	0.0000	0.0000	135.31	0.00	2.84	-0.017388

REFLUX	ERROR	FEED	FEED CONC.
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135.31	0.3971	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.18	219.01	7709.41	114376.18
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TABLE 1 - CLOSED LOOP - STEP IN FEED FLOW - 10.00

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0145	0.1304	1.0007	10.44	153.73	14.93	-0.011073
2	0.0872	0.3363	0.8822	104.37	132.47	3.84	-0.020073
3	0.2242	0.5242	0.7380	206.13	124.27	3.76	-0.133073
4	0.4402	0.7240	0.4102	222.33	173.40	3.63	-0.124073
5	0.2882	0.8429	0.0897	23.17	187.06	3.46	-0.143225
6	0.1214	0.8967	0.8611	107.27	197.11	3.30	-0.112073
7	0.8462	0.7323	0.1944	117.72	204.08	3.21	-0.060047
8	0.9024	0.9292	0.8870	124.69	209.24	3.12	-0.043736
9	0.9468	0.9712	0.8829	129.24	212.23	3.10	-0.041224
10	0.9777	0.9900	0.0000	132.29	0.00	2.84	-0.013388
REFLUX	ERROR	FEED	FEED CONC.				
132.31	-0.0033	120.20	0.2060				
STEAM FLOW	REBOILER	TEMPERATURE	COEFFICIENT	HEAT LOAD			
118.20	204.10	218.94	1709.41	114376.18			

TIME = 42.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0144	0.1274	1.0007	13.17	153.89	14.93	0.001278
2	0.0823	0.3291	0.8842	106.76	132.04	3.76	0.020086
3	0.2167	0.5167	0.8402	208.20	123.87	3.76	0.001011
4	0.4402	0.7223	0.9006	221.23	172.89	3.63	-0.000206
5	0.2807	0.8390	0.0747	23.48	186.36	3.47	-0.122141
6	0.1448	0.8938	0.8242	109.43	196.29	3.31	-0.033376
7	0.8422	0.9297	0.1680	119.21	203.37	3.21	-0.020124
8	0.9022	0.9272	0.8224	126.09	208.20	3.12	-0.028028
9	0.9468	0.9707	0.8829	131.22	212.23	3.10	-0.016074
10	0.9769	0.9900	0.0000	132.21	0.00	2.84	-0.013388
REFLUX	ERROR	FEED	FEED CONC.				
132.31	0.0071	120.20	0.2060				
STEAM FLOW	REBOILER	TEMPERATURE	COEFFICIENT	HEAT LOAD			
118.20	219.01	219.41	1709.41	114376.18			

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0143	0.1314	1.0907	75.54	123.76	14.93	0.009816
2	0.0878	0.3380	0.8656	199.28	135.54	3.84	0.047510
3	0.2238	0.5941	0.8381	211.03	154.53	3.76	0.105370
4	0.4070	0.7583	0.9081	229.95	173.24	3.62	0.091209
5	0.5842	0.8407	0.9784	98.08	186.58	3.46	0.090340
6	0.7460	0.8943	0.8557	111.34	196.50	3.31	0.055159
7	0.8422	0.9297	0.7678	121.21	203.23	3.21	0.023691
8	0.9017	0.9573	0.8554	127.92	208.27	3.15	0.015156
9	0.9463	0.9764	0.8859	132.94	212.43	3.10	0.004405
10	0.9765	0.0000	0.0000	137.09	0.00	2.84	-0.001478

REFLUX ERROR FEED FEED CONC.

137.09 0.6367 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.08	218.91	7709.41	114376.18
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0152	0.1382	1.0907	76.11	124.06	14.93	0.010614
2	0.0923	0.3519	0.8677	200.14	136.32	3.84	0.056980
3	0.2331	0.6063	0.8348	212.38	155.73	3.75	0.097514
4	0.4156	0.7639	0.9201	231.72	173.94	3.61	0.104640
5	0.5933	0.8453	1.0022	99.34	187.34	3.46	0.103987
6	0.7523	0.8972	0.8620	112.64	196.99	3.30	0.083145
7	0.8454	0.9319	0.7909	122.21	203.68	3.21	0.046821
8	0.9042	0.9584	0.8554	128.85	208.65	3.15	0.039204
9	0.9474	0.9769	0.8859	133.79	212.38	3.10	0.018320
10	0.9767	0.0000	0.0000	137.49	0.00	2.84	0.013063

REFLUX ERROR FEED FEED CONC.

137.49 0.4843 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.91	218.75	7709.41	114376.16
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TABLE II-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 5

TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.014	0.1314	1.0907	75.24	153.76	14.23	0.009816
2	0.0376	0.3760	0.8856	194.23	135.24	3.84	0.047210
3	0.2536	0.2941	0.9381	211.03	184.23	7.76	0.102370
4	0.4070	0.1783	0.9081	227.08	173.24	3.65	0.001509
5	0.5847	0.8447	0.9784	98.09	186.24	7.22	0.000340
6	0.7460	0.8743	0.9957	111.34	195.24	3.31	0.002159
7	0.8423	0.9507	0.7678	151.21	203.23	1.21	0.001141
8	0.9017	0.9213	0.8254	157.95	204.23	3.15	0.012156
9	0.9463	0.9764	0.8459	135.04	215.23	3.10	0.004405
10	0.9768	0.0000	0.0000	137.04	0.00	5.84	-0.001478

REFLUX ERROR FEED FEED CONC.

137.09 0.6867 150.20 0.2060

STEAM TEMPERATURE
FLOW REFRIGIER STEAM

118.20 204.08 218.91 114370.11

TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0125	0.1385	1.0907	76.11	154.06	14.23	0.010614
2	0.0823	0.3710	0.8677	200.14	174.73	3.84	0.000000
3	0.2181	0.4243	0.8348	215.38	155.73	3.75	0.004514
4	0.4126	0.7730	0.4501	231.75	173.94	3.61	0.104640
5	0.5933	0.8453	1.0055	99.34	187.34	3.46	0.000000
6	0.7527	0.8975	0.8650	115.64	196.73	3.30	0.000314
7	0.8454	0.9319	0.7909	155.21	203.68	1.21	0.0046821
8	0.9463	0.9284	0.8254	158.85	208.65	3.15	0.003504
9	0.9474	0.9769	0.8859	137.79	215.38	3.10	0.019390
10	0.9767	0.0000	0.0000	137.49	0.00	5.84	0.010000

REFLUX ERROR FEED FEED CONC.

137.49 0.4843 150.20 0.2060

STEAM TEMPERATURE
FLOW REFRIGIER STEAM

118.20 203.91 217.75 114370.11

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0159	0.1434	1.0907	74.99	124.28	14.93	0.004504
2	0.0958	0.3603	0.8677	199.26	136.79	3.84	0.024983
3	0.2392	0.6147	0.8348	211.76	156.58	3.75	0.046088
4	0.4223	0.7671	0.9201	231.51	174.36	3.61	0.047519
5	0.6003	0.8479	1.0023	98.76	187.76	3.45	0.053746
6	0.7571	0.8991	0.8635	112.10	197.37	3.30	0.039133
7	0.8485	0.9336	0.8019	121.67	204.07	3.21	0.027225
8	0.9066	0.9597	0.8716	128.34	209.18	3.15	0.019830
9	0.9491	0.9776	0.8823	133.43	212.30	3.10	0.015585
10	0.9774	0.0000	0.0000	136.53	0.00	2.84	0.011972

REFLUX	ERROR	FEED	FEED CONC.
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136.53	0.0867	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.79	218.62	7709.41	114376.18
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0161	0.1454	1.0907	74.17	124.37	14.93	0.000733
2	0.0972	0.3637	0.8677	198.54	136.99	3.84	0.004392
3	0.2418	0.6177	0.8348	211.16	156.89	3.75	0.009350
4	0.4249	0.7683	0.9201	231.05	174.54	3.61	0.010219
5	0.6033	0.8490	1.0023	98.19	187.97	3.45	0.015645
6	0.7595	0.9000	0.8635	111.60	197.57	3.30	0.014992
7	0.8502	0.9343	0.8019	121.19	204.27	3.20	0.011925
8	0.9079	0.9603	0.8716	127.89	209.46	3.14	0.008690
9	0.9500	0.9778	0.8731	133.06	212.27	3.10	0.005530
10	0.9778	0.0000	0.0000	135.86	0.00	2.83	0.006538

REFLUX	ERROR	FEED	FEED CONC.
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135.86	-0.1028	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.74	218.57	7709.41	114376.18
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TABLE 5-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	138.23	138.23	0.00	0.01143
2	0.0000	0.0000	138.23	138.23	0.00	0.01258
3	0.0000	0.0000	138.23	138.23	0.00	0.01373
4	0.0000	0.0000	138.23	138.23	0.00	0.01488
5	0.0000	0.0000	138.23	138.23	0.00	0.01603
6	0.0000	0.0000	138.23	138.23	0.00	0.01718
7	0.0000	0.0000	138.23	138.23	0.00	0.01833
8	0.0000	0.0000	138.23	138.23	0.00	0.01948
9	0.0000	0.0000	138.23	138.23	0.00	0.02063
10	0.0000	0.0000	138.23	138.23	0.00	0.02178
REFLUX	ERROR	FEED	FEED CONC.			
136.23	0.0867	151.25	0.2060			
STEAM FLOW	RECYCLER	TEMPERATURE	COEFFICIENT	HEAT LOAD		
118.20	503.74	218.65	2700.41	114376.14		

TIME = 65.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	138.23	138.23	0.00	0.00623
2	0.0000	0.0000	138.23	138.23	0.00	0.00738
3	0.0000	0.0000	138.23	138.23	0.00	0.00853
4	0.0000	0.0000	138.23	138.23	0.00	0.00968
5	0.0000	0.0000	138.23	138.23	0.00	0.01083
6	0.0000	0.0000	138.23	138.23	0.00	0.01198
7	0.0000	0.0000	138.23	138.23	0.00	0.01313
8	0.0000	0.0000	138.23	138.23	0.00	0.01428
9	0.0000	0.0000	138.23	138.23	0.00	0.01543
10	0.0000	0.0000	138.23	138.23	0.00	0.01658
REFLUX	ERROR	FEED	FEED CONC.			
135.86	-0.1024	150.50	0.2060			
STEAM FLOW	RECYCLER	TEMPERATURE	COEFFICIENT	HEAT LOAD		
118.20	503.74	218.27	2700.41	114376.14		

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0160	0.1446	1.0907	73.41	124.34	14.93	-0.002988
2	0.0966	0.3623	0.8677	197.75	136.91	3.84	-0.015615
3	0.2410	0.6167	0.8348	210.33	156.80	3.75	-0.025487
4	0.4243	0.7680	0.9201	230.23	174.51	3.61	-0.021608
5	0.6031	0.8490	1.0023	97.46	187.98	3.45	-0.016546
6	0.7598	0.9001	0.8635	110.95	197.61	3.30	-0.007526
7	0.8505	0.9345	0.8019	120.59	204.34	3.20	-0.003088
8	0.9082	0.9604	0.8716	127.32	209.54	3.14	-0.001132
9	0.9502	0.9779	0.8731	132.52	212.29	3.10	-0.000033
10	0.9779	0.0000	0.0000	135.27	0.00	2.83	0.001264

REFLUX	ERROR	FEED	FEED CONC.
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135.27	-0.1932	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.76	218.60	7709.41	114376.18
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0157	0.1420	1.0907	73.01	124.22	14.93	-0.004514
2	0.0949	0.3581	0.8677	197.24	136.68	3.84	-0.023262
3	0.2381	0.6132	0.8348	209.71	156.45	3.75	-0.038405
4	0.4217	0.7668	0.9201	229.51	174.36	3.61	-0.039597
5	0.6010	0.8482	1.0023	96.95	187.87	3.45	-0.033212
6	0.7586	0.8997	0.8635	110.50	197.56	3.30	-0.019085
7	0.8499	0.9342	0.8019	120.20	204.31	3.20	-0.010817
8	0.9078	0.9602	0.8716	126.97	209.52	3.14	-0.006215
9	0.9500	0.9779	0.8731	132.18	212.33	3.10	-0.003032
10	0.9779	0.0000	0.0000	135.00	0.00	2.83	-0.001989

REFLUX	ERROR	FEED	FEED CONC.
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135.00	-0.1806	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.82	218.66	7709.41	114376.16
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TABLE 1000 CLOSED LOOP - STEP IN FEED FLOW - RUN 5

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HELD-UP	DERIVATIVE
1	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX 135.25 -0.1000
FEED 100.00
FEED CONC. 0.2000

STEAM FLOW 118.50
REBILIER STEAM 503.70
TEMPERATURE 518.00
COEFFICIENT 1709.41
HEAT LOAD 114376.10

TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HELD-UP	DERIVATIVE
1	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0100	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX 135.00 -0.1800
FEED 150.50
FEED CONC. 0.2000

STEAM FLOW 118.50
REBILIER STEAM 503.85
TEMPERATURE 518.00
COEFFICIENT 1709.41
HEAT LOAD 114376.10

TABLE U-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0153	0.1392	1.0907	72.97	124.10	14.93	-0.004039
2	0.0930	0.3534	0.8677	197.08	136.42	3.84	-0.021328
3	0.2349	0.6087	0.8348	209.41	156.00	3.75	-0.036251
4	0.4183	0.7652	0.9201	229.01	174.16	3.61	-0.038633
5	0.5980	0.8471	1.0023	96.71	187.70	3.45	-0.035582
6	0.7568	0.8990	0.8635	110.28	197.44	3.30	-0.021709
7	0.8489	0.9337	0.8019	120.04	204.23	3.21	-0.012800
8	0.9072	0.9600	0.8716	126.85	209.44	3.15	-0.007576
9	0.9497	0.9777	0.8731	132.06	212.35	3.10	-0.003918
10	0.9778	0.0000	0.0000	134.98	0.00	2.83	-0.003273

REFLUX	ERROR	FEED	FEED CONC.
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134.98	-0.1145	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.89	218.73	7709.41	114376.18
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TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0150	0.1369	1.0907	73.15	124.00	14.93	-0.002731
2	0.0915	0.3497	0.8677	197.16	136.21	3.84	-0.014467
3	0.2323	0.6051	0.8348	209.38	155.64	3.75	-0.024946
4	0.4155	0.7638	0.9201	228.81	173.99	3.61	-0.027094
5	0.5953	0.8461	1.0023	96.69	187.55	3.45	-0.027536
6	0.7551	0.8983	0.8635	110.27	197.33	3.30	-0.017562
7	0.8479	0.9333	0.8019	120.08	204.15	3.21	-0.010613
8	0.9067	0.9597	0.8716	126.90	209.34	3.15	-0.006372
9	0.9494	0.9776	0.8731	132.11	212.37	3.10	-0.003387
10	0.9776	0.0000	0.0000	135.14	0.00	2.83	-0.003150

REFLUX	ERROR	FEED	FEED CONC.
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135.14	-0.0356	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.95	218.78	7709.41	114376.18
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TABLE II-10 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	FEED-UP	DERIVATIVE
1	0.0153	0.1895	1.0907	77.97	154.10	14.91	-0.000175
2	0.0230	0.3234	0.9877	80.70	136.48	1.88	-0.000075
3	0.0349	0.6087	0.9146	80.41	156.00	1.77	-0.000251
4	0.0418	0.7673	0.8541	55.01	174.16	3.61	-0.000033
5	0.0525	0.7471	1.0253	96.71	181.70	3.42	-0.000008
6	0.0724	0.8990	0.9835	110.23	197.44	3.88	-0.000109
7	0.0848	0.9337	0.9019	120.04	204.23	3.81	-0.000200
8	0.0907	0.9500	0.8716	124.07	209.44	3.15	-0.000154
9	0.0949	0.9777	0.8731	137.04	215.35	1.17	-0.000314
10	0.0978	0.9700	0.9400	134.98	0.00	5.88	-0.000373

REFLUX ERROR FEED FEED CONC.

134.98 -0.1142 150.20 0.5060

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

118.20 503.99 518.73 1700.41 114376.10

TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	FEED-UP	DERIVATIVE
1	0.0150	0.1888	1.0907	73.15	154.00	14.93	-0.000175
2	0.0215	0.3497	0.8677	107.14	136.21	3.84	-0.000463
3	0.0349	0.6087	0.9146	80.38	156.04	1.78	-0.000075
4	0.0418	0.7673	0.9201	55.01	174.94	3.61	-0.000004
5	0.0525	0.8461	1.0023	96.69	187.25	3.48	-0.000008
6	0.0725	0.8983	0.9835	110.27	197.33	3.80	-0.000104
7	0.0847	0.9333	0.9019	120.08	204.15	3.81	-0.000103
8	0.0907	0.9547	0.8716	126.90	209.34	3.10	-0.000143
9	0.0949	0.9776	0.8731	137.11	215.37	1.17	-0.000314
10	0.0978	0.9700	0.9400	135.14	0.00	5.88	-0.000373

REFLUX ERROR FEED FEED CONC.

135.14 -0.0104 150.20 0.5060

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

118.20 503.99 518.73 1700.41 114376.10

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.2966	1.1275	74.21	125.65	14.88	0.000004
2	0.2004	0.5682	0.8607	199.86	144.00	3.77	0.000011
3	0.3877	0.7400	0.7939	218.21	161.89	3.64	0.000008
4	0.5192	0.8145	0.9692	236.10	172.61	3.52	0.000002
5	0.6826	0.8726	0.8903	96.52	182.71	3.37	0.000001
6	0.7947	0.9193	1.0322	106.62	191.85	3.26	0.000000
7	0.8783	0.9462	0.7891	115.76	197.16	3.18	-0.000001
8	0.9238	0.9659	0.8030	121.07	201.02	3.13	-0.000001
9	0.9561	0.9818	0.9873	124.93	204.10	3.09	-0.000001
10	0.9818	0.0000	0.0000	128.01	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
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128.01	-0.0356	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.78	6437.43	106273.27
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0765	0.4307	1.1141	99.66	118.25	14.80	0.473238
2	0.3019	0.6928	0.9031	216.90	138.91	3.71	1.020621
3	0.4829	0.7949	0.8365	236.76	150.39	3.56	0.746858
4	0.5654	0.8360	1.0133	247.59	156.79	3.48	0.374995
5	0.7270	0.8886	0.8820	103.34	165.45	3.33	0.410802
6	0.8257	0.9257	0.8482	111.60	172.09	3.23	0.301851
7	0.8915	0.9533	0.8582	117.93	177.31	3.16	0.125518
8	0.9360	0.9703	0.7523	123.02	180.45	3.11	0.114538
9	0.9636	0.9819	0.7063	126.03	182.47	3.09	0.061769
10	0.9818	0.0000	0.0000	127.99	0.00	2.83	0.006539

REFLUX	ERROR	FEED	FEED CONC.
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127.99	-0.0033	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	194.61	209.21	6437.43	93990.61
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TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 2.00

PLATE CONC CONCA EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0375	0.2988	1.1275	14.21	157.05	14.88	0.00000
2	0.2588	0.2988	1.1275	19.76	144.00	8.77	0.00011
3	0.3877	0.1400	0.1939	21.21	161.89	7.68	0.00000
4	0.2192	0.8145	0.2445	28.10	173.61	8.52	0.00000
5	0.6882	0.1126	0.2903	22.73	182.71	8.37	0.00001
6	0.1747	0.1171	1.0322	106.62	191.82	8.26	0.00000
7	0.8783	0.9462	0.1891	112.76	191.16	8.18	0.00001
8	0.9238	0.9462	0.8030	121.07	201.08	8.11	0.00001
9	0.9261	0.9818	0.9873	124.93	204.11	7.09	0.00001
10	0.9818	0.0000	0.0000	128.01	0.00	2.83	0.00001

REFLUX ERROR FEED FEED CONC.

128.01 -0.0326 120.30 0.2126

STEAM TEMPERATURE
FLOW RECYCLER STEAM

102.90 200.27 216.78 6437.43 106213.27

TIME = 2.00

PLATE CONC CONCA EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0375	0.4907	1.1141	29.66	114.29	14.80	0.47328
2	0.3019	0.4728	0.9031	216.90	138.91	1.71	0.020621
3	0.4728	0.1949	0.8362	236.76	120.39	7.26	0.14622
4	0.2524	0.8320	1.0133	247.29	126.79	8.48	0.14992
5	0.1720	0.8886	0.8820	103.34	162.42	8.33	0.410802
6	0.8227	0.9227	0.8482	111.60	172.03	8.40	0.301821
7	0.8212	0.7223	0.8282	117.93	177.31	8.16	0.122218
8	0.9160	0.9103	0.1223	123.02	180.42	7.11	0.114238
9	0.9834	0.9819	0.1063	126.03	182.74	8.09	0.081769
10	0.9818	0.0000	0.0000	127.22	0.00	2.83	0.00000

REFLUX ERROR FEED - FEED CONC.

127.22 -0.0033 120.30 0.2126

STEAM TEMPERATURE
FLOW RECYCLER STEAM

91.70 194.61 216.21 6437.43 13302.01

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1091	0.5016	1.1028	89.31	123.47	14.73	0.269857
2	0.3562	0.7345	0.9257	212.17	144.19	3.66	0.385565
3	0.5196	0.8125	0.8530	232.58	153.72	3.52	0.205560
4	0.5807	0.8421	1.0252	241.92	158.77	3.47	0.058676
5	0.7448	0.8952	0.8803	96.61	167.83	3.31	0.056124
6	0.8392	0.9304	0.8184	105.62	174.38	3.22	0.049842
7	0.8987	0.9563	0.8593	112.11	179.51	3.15	0.035877
8	0.9408	0.9724	0.7523	117.21	182.64	3.11	0.022069
9	0.9662	0.9832	0.7063	120.32	184.62	3.08	0.013624
10	0.9829	0.0000	0.0000	122.28	0.00	2.83	0.020600

REFLUX	ERROR	FEED	FEED CONC.
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122.28	-1.1231	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	190.43	205.07	6437.43	94253.86
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1239	0.5273	1.0977	83.62	125.59	14.70	0.100086
2	0.3733	0.7446	0.9329	208.98	145.62	3.65	0.085155
3	0.5264	0.8159	0.8558	228.95	154.45	3.52	0.012336
4	0.5810	0.8423	1.0252	237.77	158.99	3.47	-0.022851
5	0.7441	0.8949	0.8803	92.02	167.98	3.31	-0.043689
6	0.8389	0.9303	0.8184	101.05	174.56	3.22	-0.035460
7	0.8987	0.9563	0.8593	107.67	179.72	3.15	-0.024375
8	0.9409	0.9725	0.7523	112.86	182.87	3.11	-0.013427
9	0.9664	0.9833	0.7063	116.02	184.88	3.08	-0.005829
10	0.9833	0.0000	0.0000	118.03	0.00	2.83	-0.000742

REFLUX	ERROR	FEED	FEED CONC.
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118.03	-1.5349	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.55	203.21	6437.43	94372.25
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TABLE II-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - 10.0

TIME = 10.0

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	WLD-UP	DERIVATIVE
1	0.1091	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.3565	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.2196	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.2807	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.7444	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.8395	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.8287	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.9408	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.9665	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.9854	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	155.58	-1.1541	150.30	0.2156			
FEED							
FEED CONC.							
STEAM FLOW	96.70	190.43	505.07	6437.43	6437.43		
REBOILER STEAM							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	WLD-UP	DERIVATIVE
1	0.1239	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.3733	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.2564	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.2810	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.7441	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.8395	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.8287	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.9409	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.9664	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.9853	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	118.03	-1.5349	150.30	0.2156			
FEED							
FEED CONC.							
STEAM FLOW	96.70	190.43	505.07	6437.43	6437.43		
REBOILER STEAM							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1286	0.5348	1.0961	82.13	126.21	14.69	0.027029
2	0.3766	0.7466	0.9343	208.28	145.88	3.65	0.013724
3	0.5261	0.8158	0.8558	227.94	154.44	3.52	-0.009642
4	0.5791	0.8416	1.0252	236.51	158.83	3.47	-0.017500
5	0.7404	0.8935	0.8803	90.61	167.63	3.31	-0.038359
6	0.8356	0.9289	0.8184	99.45	174.16	3.22	-0.037374
7	0.8962	0.9553	0.8593	106.02	179.31	3.16	-0.029654
8	0.9394	0.9718	0.7523	111.20	182.49	3.11	-0.019373
9	0.9656	0.9829	0.7063	114.40	184.51	3.08	-0.011054
10	0.9830	0.0000	0.0000	116.44	0.00	2.83	-0.009911

REFLUX	ERROR	FEED	FEED CONC.
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116.44	-1.2547	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.96	202.63	6437.43	94409.49
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1300	0.5370	1.0956	82.23	126.39	14.69	0.011218
2	0.3774	0.7470	0.9346	208.60	145.94	3.65	0.008252
3	0.5256	0.8156	0.8556	228.14	154.41	3.52	-0.001518
4	0.5782	0.8412	1.0252	236.61	158.75	3.47	-0.004834
5	0.7381	0.8927	0.8803	90.65	167.43	3.32	-0.017250
6	0.8332	0.9279	0.8184	99.36	173.89	3.22	-0.019517
7	0.8942	0.9544	0.8593	105.84	179.01	3.16	-0.017542
8	0.9380	0.9712	0.7523	110.97	182.18	3.11	-0.012931
9	0.9648	0.9825	0.7063	114.16	184.21	3.08	-0.008342
10	0.9826	0.0000	0.0000	116.19	0.00	2.83	-0.009130

REFLUX	ERROR	FEED	FEED CONC.
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116.19	-0.8149	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.79	202.45	6437.43	94420.56
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TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 50.12

PLATE CONC VAPOR LIQUID EFFICIENCY HOLD-UP DERIVATIVE

1	0.1588	0.7148	1.0061	81.13	156.51	14.01	0.051059
2	0.3166	0.7466	0.9998	508.28	142.88	1.00	0.013754
3	0.4744	0.7158	0.9978	527.94	154.44	3.47	-0.009645
4	0.5781	0.7411	1.0073	136.51	154.63	3.47	-0.015200
5	0.7464	0.8387	0.9973	90.61	167.63	3.31	-0.013839
6	0.8333	0.9589	0.8184	99.45	174.16	3.28	-0.037818
7	0.8865	0.9953	0.9993	109.15	179.31	3.16	-0.059645
8	0.9394	0.9718	0.9523	111.50	185.49	3.11	-0.019813
9	0.9664	0.9959	0.7063	119.40	184.51	1.00	-0.011194
10	0.9830	0.0000	0.0000	116.44	0.00	2.83	-0.009911

REFLUX ERROR FEED FEED CONC.

116.44 -1.5247 150.30 0.2156

STEAM FLOW REFLUX TEMPERATURE COEFFICIENT WEIGHT LOAD

96.70 187.96 505.43 9437.43 0.0000

TIME = 52.01

PLATE CONC VAPOR LIQUID EFFICIENCY HOLD-UP DERIVATIVE

1	0.1300	0.5370	1.0056	85.23	186.39	14.69	0.011219
2	0.3174	0.7470	0.9946	508.60	142.94	3.67	0.010798
3	0.5256	0.8156	0.8256	528.14	154.41	3.52	-0.001511
4	0.5785	0.9413	1.0252	536.61	167.79	3.47	-0.004837
5	0.7381	0.8927	0.8803	90.65	167.44	3.35	-0.015891
6	0.8335	0.9279	0.8184	99.36	173.89	3.28	-0.019915
7	0.8845	0.9944	0.8293	105.84	179.61	3.16	-0.015247
8	0.9380	0.9715	0.9523	110.97	185.18	3.11	-0.015931
9	0.9664	0.9852	0.7063	114.16	184.51	3.08	-0.009845
10	0.9856	0.0000	0.0000	116.19	0.00	2.83	-0.009118

REFLUX ERROR FEED FEED CONC.

116.19 -0.8149 150.30 0.2156

STEAM FLOW REFLUX TEMPERATURE COEFFICIENT WEIGHT LOAD

96.70 187.96 505.43 9437.43 0.0000

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1308	0.5383	1.0953	82.46	126.51	14.68	0.008876
2	0.3782	0.7475	0.9349	208.95	146.01	3.65	0.009843
3	0.5257	0.8157	0.8557	228.44	154.43	3.52	0.003160
4	0.5781	0.8412	1.0252	236.86	158.74	3.47	0.000049
5	0.7372	0.8924	0.8803	90.88	167.37	3.32	-0.005994
6	0.8321	0.9275	0.8184	99.51	173.79	3.22	-0.008296
7	0.8931	0.9540	0.8593	105.94	178.87	3.16	-0.008362
8	0.9372	0.9708	0.7523	111.03	182.04	3.11	-0.006810
9	0.9642	0.9822	0.7063	114.20	184.06	3.09	-0.004778
10	0.9823	0.0000	0.0000	116.23	0.00	2.83	-0.005669

REFLUX	ERROR	FEED	FEED CONC.
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116.23	-0.4893	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.68	202.35	6437.43	94427.08
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1315	0.5394	1.0951	82.53	126.60	14.68	0.006490
2	0.3789	0.7479	0.9352	209.11	146.07	3.64	0.007356
3	0.5259	0.8158	0.8558	228.58	154.46	3.52	0.002653
4	0.5781	0.8412	1.0252	236.96	158.76	3.47	0.000237
5	0.7369	0.8922	0.8803	90.96	167.36	3.32	-0.002878
6	0.8316	0.9273	0.8184	99.57	173.76	3.22	-0.004151
7	0.8926	0.9538	0.8593	105.97	178.82	3.16	-0.004338
8	0.9368	0.9706	0.7523	111.04	181.97	3.11	-0.003662
9	0.9639	0.9821	0.7063	114.19	183.99	3.09	-0.002639
10	0.9821	0.0000	0.0000	116.21	0.00	2.83	-0.003145

REFLUX	ERROR	FEED	FEED CONC.
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116.21	-0.3003	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.60	202.27	6437.43	94432.24
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TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 10.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.1308	0.2383	1.0023	85.46	156.21	14.68	0.00816
2	0.3785	0.7475	0.4349	508.25	146.01	3.62	0.00777
3	0.2527	0.8127	0.8257	528.44	154.44	3.25	0.00310
4	0.2781	0.8412	1.0225	536.86	155.74	3.47	0.00064
5	0.7315	0.8254	0.8803	90.88	157.37	3.35	-0.00234
6	0.8321	0.9275	0.8184	99.21	173.77	1.55	-0.00226
7	0.8931	0.9240	0.8293	102.94	178.85	1.16	-0.00365
8	0.9375	0.9708	0.7523	111.03	182.04	1.11	-0.00810
9	0.9645	0.9825	0.7063	114.20	184.06	1.09	-0.00478
10	0.9823	0.9900	0.6000	116.23	0.00	2.83	-0.00664

REFLUX ERROR FEED FEED CONC.

116.23 -0.4893 120.30 0.2126

STEAM TEMPERATURE
FLW REBCILER STEAM

96.75 187.68 502.32 6437.43 9442.76

TIME = 35.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.1312	0.2374	1.0021	85.23	156.60	14.68	0.00491
2	0.3789	0.7479	0.4325	509.11	146.07	3.64	0.00777
3	0.2529	0.8128	0.8258	528.24	154.46	3.25	0.00310
4	0.2781	0.8412	1.0225	536.86	155.74	3.47	0.00064
5	0.7315	0.8254	0.8803	90.88	157.36	3.35	-0.00234
6	0.8318	0.9273	0.8184	99.27	173.76	1.55	-0.00226
7	0.8924	0.9238	0.8293	102.97	178.85	1.16	-0.00365
8	0.9368	0.9706	0.7523	111.04	181.97	1.11	-0.00865
9	0.9639	0.9821	0.7063	114.19	183.99	1.09	-0.00478
10	0.9821	0.9900	0.6000	116.21	0.00	2.83	-0.00664

REFLUX ERROR FEED FEED CONC.

116.21 -0.3003 120.30 0.2126

STEAM TEMPERATURE
FLW REBCILER STEAM

96.75 187.68 502.32 6437.43 9442.76

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1319	0.5401	1.0950	82.50	126.66	14.68	0.003657
2	0.3794	0.7482	0.9354	209.15	146.11	3.64	0.003736
3	0.5261	0.8159	0.8558	228.60	154.48	3.52	0.000997
4	0.5781	0.8412	1.0252	236.97	158.76	3.47	-0.000401
5	0.7367	0.8922	0.8803	90.95	167.35	3.32	-0.002303
6	0.8313	0.9272	0.8184	99.54	173.74	3.22	-0.002859
7	0.8923	0.9537	0.8593	105.93	178.79	3.16	-0.002815
8	0.9365	0.9705	0.7523	110.99	181.94	3.11	-0.002290
9	0.9638	0.9820	0.7063	114.14	183.95	3.09	-0.001607
10	0.9820	0.0000	0.0000	116.15	0.00	2.83	-0.001843

REFLUX	ERROR	FEED	FEED CONC.
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116.15	-0.1937	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.55	202.22	6437.43	94435.59
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1321	0.5405	1.0949	82.47	126.69	14.68	0.001596
2	0.3796	0.7483	0.9354	209.16	146.12	3.64	0.001360
3	0.5261	0.8159	0.8558	228.59	154.48	3.52	-0.000036
4	0.5781	0.8412	1.0252	236.95	158.76	3.47	-0.000630
5	0.7365	0.8921	0.8803	90.93	167.34	3.32	-0.001892
6	0.8311	0.9271	0.8184	99.51	173.72	3.22	-0.002143
7	0.8922	0.9536	0.8593	105.89	178.76	3.16	-0.002007
8	0.9364	0.9705	0.7523	110.94	181.91	3.11	-0.001569
9	0.9637	0.9819	0.7063	114.09	183.92	3.09	-0.001069
10	0.9820	0.0000	0.0000	116.10	0.00	2.83	-0.001192

REFLUX	ERROR	FEED	FEED CONC.
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116.10	-0.1282	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.52	202.19	6437.43	94437.27
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TABLE 1 - CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 45.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	DIFFERENTIAL
10	0.9820	0.0000	0.0000	116.15	0.00
9	0.9638	0.0020	0.0063	114.14	183.95
8	0.9447	0.0040	0.0123	110.94	181.91
7	0.8225	0.0020	0.0063	105.89	178.79
6	0.8311	0.0021	0.0084	99.21	173.75
5	0.7362	0.0021	0.00803	90.73	167.34
4	0.5781	0.00415	1.0252	536.92	158.73
3	0.5261	0.00129	0.8228	528.77	154.44
2	0.3799	0.0048	0.0024	509.16	146.15
1	0.1321	0.00405	1.0049	85.47	154.44
REFLUX	116.15	-0.1937	150.30	0.2126	
STEAM FLOW	26.70	187.55	505.25	6437.43	
TEMPERATURE					
COEFFICIENT					
HEAT LOAD					

TIME = 45.00

PLATE	CONCX	CONCA EFFICI	LIQUID	VAPOR	DIFFERENTIAL
10	0.9820	0.0000	0.0000	116.10	0.00
9	0.9638	0.0020	0.0063	114.09	183.95
8	0.9447	0.0040	0.0123	110.94	181.91
7	0.8225	0.0020	0.0063	105.89	178.79
6	0.8311	0.0021	0.0084	99.21	173.75
5	0.7362	0.0021	0.00803	90.73	167.34
4	0.5781	0.00415	1.0252	536.92	158.73
3	0.5261	0.00129	0.8228	528.77	154.44
2	0.3799	0.0048	0.0024	509.16	146.15
1	0.1321	0.00405	1.0049	85.47	154.44
REFLUX	116.10	-0.1585	150.30	0.2126	
STEAM FLOW	26.70	187.55	505.19	6437.41	
TEMPERATURE					
COEFFICIENT					
HEAT LOAD					

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1322	0.5406	1.0949	82.46	126.70	14.68	0.000496
2	0.3796	0.7483	0.9354	209.16	146.13	3.64	0.000225
3	0.5261	0.8159	0.8558	228.59	154.48	3.52	-0.000323
4	0.5780	0.8411	1.0252	236.94	158.75	3.47	-0.000530
5	0.7363	0.8921	0.8803	90.91	167.33	3.32	-0.001368
6	0.8310	0.9271	0.8184	99.49	173.70	3.22	-0.001511
7	0.8920	0.9535	0.8593	105.86	178.74	3.16	-0.001391
8	0.9363	0.9704	0.7523	110.91	181.89	3.11	-0.001073
9	0.9636	0.9819	0.7063	114.05	183.90	3.09	-0.000724
10	0.9819	0.0000	0.0000	116.06	0.00	2.83	-0.000803

REFLUX	ERROR	FEED	FEED CONC.
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116.06	-0.0846	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.51	202.18	6437.43	94437.92
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1322	0.5406	1.0949	82.46	126.70	14.68	0.000031
2	0.3796	0.7483	0.9354	209.16	146.13	3.64	-0.000224
3	0.5261	0.8159	0.8558	228.59	154.48	3.52	-0.000355
4	0.5780	0.8411	1.0252	236.94	158.75	3.47	-0.000386
5	0.7363	0.8920	0.8803	90.91	167.32	3.32	-0.000912
6	0.8309	0.9270	0.8184	99.48	173.69	3.22	-0.001000
7	0.8919	0.9535	0.8593	105.85	178.73	3.16	-0.000920
8	0.9362	0.9704	0.7523	110.89	181.87	3.11	-0.000711
9	0.9635	0.9819	0.7063	114.03	183.88	3.09	-0.000479
10	0.9819	0.0000	0.0000	116.04	0.00	2.83	-0.000535

REFLUX	ERROR	FEED	FEED CONC.
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116.04	-0.0553	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.51	202.18	6437.43	94438.06
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TABLE II-11 CLOSED LOOP - STEAM IN STEAM FLOW RATE - RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1325	0.2406	1.0949	85.46	156.70	14.68	-0.00044
2	0.3796	0.7483	0.9354	100.16	144.18	1.64	-0.00024
3	0.2561	0.8159	0.8958	128.59	154.49	1.85	-0.00034
4	0.2780	0.8411	1.0252	137.94	154.75	1.47	-0.00038
5	0.7363	0.8920	0.8403	90.91	167.33	3.35	-0.00015
6	0.8319	0.9270	0.8184	99.48	173.43	1.25	-0.00106
7	0.8219	0.9270	0.8403	105.85	178.73	3.16	-0.00045
8	0.9363	0.9704	0.7523	110.90	181.87	1.11	-0.00071
9	0.9635	0.9819	0.7063	114.03	183.88	1.09	-0.00047
10	0.9819	0.9900	0.6000	116.04	184.00	2.83	-0.00045
REFLUX	116.04	-0.0846	126.39	FEED			
STEAM	TEMPERATURE				COEFFICIENT	HEAT LOAD	
FLW	REBCILER	STEAM	187.51	202.18	9437.43	9437.43	

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1325	0.2406	1.0949	85.46	156.70	14.68	-0.00044
2	0.3796	0.7483	0.9354	100.16	144.18	1.64	-0.00024
3	0.2561	0.8159	0.8958	128.59	154.49	1.85	-0.00034
4	0.2780	0.8411	1.0252	137.94	154.75	1.47	-0.00038
5	0.7363	0.8920	0.8403	90.91	167.33	3.35	-0.00015
6	0.8319	0.9270	0.8184	99.48	173.43	1.25	-0.00106
7	0.8219	0.9270	0.8403	105.85	178.73	3.16	-0.00045
8	0.9363	0.9704	0.7523	110.90	181.87	1.11	-0.00071
9	0.9635	0.9819	0.7063	114.03	183.88	1.09	-0.00047
10	0.9819	0.9900	0.6000	116.04	184.00	2.83	-0.00045
REFLUX	116.04	-0.0846	126.39	FEED			
STEAM	TEMPERATURE				COEFFICIENT	HEAT LOAD	
FLW	REBCILER	STEAM	187.51	202.18	9437.43	9437.43	
96.70	187.51	202.18	9437.43	FEED			

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 60.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1322	0.5406	1.0949	82.46	126.70	14.68	-0.000136
2	0.3796	0.7483	0.9354	209.16	146.13	3.64	-0.000330
3	0.5260	0.8159	0.8558	228.59	154.47	3.52	-0.000301
4	0.5779	0.8411	1.0252	236.94	158.75	3.47	-0.000265
5	0.7362	0.8920	0.8803	90.91	167.31	3.32	-0.000586
6	0.8308	0.9270	0.8184	99.47	173.68	3.22	-0.000641
7	0.8919	0.9535	0.8593	105.84	178.72	3.16	-0.000590
8	0.9361	0.9703	0.7523	110.88	181.86	3.11	-0.000457
9	0.9635	0.9819	0.7063	114.02	183.87	3.09	-0.000310
10	0.9819	0.0000	0.0000	116.03	0.00	2.83	-0.000347

REFLUX	ERROR	FEED	FEED CONC.
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116.03	-0.0358	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.51	202.18	6437.43	94438.02
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TIME = 65.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1322	0.5406	1.0949	82.46	126.70	14.68	-0.000190
2	0.3796	0.7483	0.9354	209.16	146.12	3.64	-0.000350
3	0.5260	0.8159	0.8558	228.59	154.47	3.52	-0.000250
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000194
5	0.7362	0.8920	0.8803	90.91	167.31	3.32	-0.000389
6	0.8308	0.9270	0.8184	99.47	173.67	3.22	-0.000416
7	0.8918	0.9535	0.8593	105.84	178.71	3.16	-0.000381
8	0.9361	0.9703	0.7523	110.87	181.85	3.11	-0.000294
9	0.9635	0.9819	0.7063	114.02	183.86	3.09	-0.000199
10	0.9819	0.0000	0.0000	116.03	0.00	2.83	-0.000222

REFLUX	ERROR	FEED	FEED CONC.
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116.03	-0.0232	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.51	202.18	6437.43	94437.91
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TABLE 1 - CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1325	0.2406	1.0949	85.46	156.70	14.66	-0.000198
2	0.3796	0.7483	0.9324	509.16	146.15	3.64	-0.000324
3	0.2560	0.8129	0.8528	528.22	124.47	3.22	-0.000220
4	0.2779	0.8411	1.0225	536.93	128.74	3.47	-0.000194
5	0.7362	0.8920	0.8803	90.71	167.31	1.74	-0.000389
6	0.8270	0.8184	0.9747	173.67	173.67	3.22	-0.000416
7	0.8218	0.9232	0.8293	102.84	178.71	1.16	-0.000381
8	0.9361	0.9703	0.7223	110.87	181.86	3.11	-0.000294
9	0.9633	0.9819	0.7063	114.02	183.86	3.09	-0.000199
10	0.9819	0.9900	0.0000	116.03	1.00	2.88	-0.000225

REFLUX 116.03 -0.0232 120.30
FEED 0.2126
FEED CONC.

STEAM REBOILER 187.21 502.18
TEMPERATURE
COEFFICIENT 6437.43
HEAT LOAD 94438.05

TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1325	0.2406	1.0949	85.46	156.70	14.66	-0.000198
2	0.3796	0.7483	0.9324	509.16	146.15	3.64	-0.000324
3	0.2560	0.8129	0.8528	528.22	124.47	3.22	-0.000220
4	0.2779	0.8411	1.0225	536.93	128.74	3.47	-0.000194
5	0.7362	0.8920	0.8803	90.71	167.31	1.74	-0.000389
6	0.8270	0.8184	0.9747	173.67	173.67	3.22	-0.000416
7	0.8218	0.9232	0.8293	102.84	178.71	1.16	-0.000381
8	0.9361	0.9703	0.7223	110.87	181.86	3.11	-0.000294
9	0.9633	0.9819	0.7063	114.02	183.86	3.09	-0.000199
10	0.9819	0.9900	0.0000	116.03	1.00	2.88	-0.000225

REFLUX 116.03 -0.0232 120.30
FEED 0.2126
FEED CONC.

STEAM REBOILER 187.21 502.18
TEMPERATURE
COEFFICIENT 6437.43
HEAT LOAD 94438.05

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1322	0.5406	1.0949	82.46	126.69	14.68	-0.000188
2	0.3795	0.7483	0.9354	209.16	146.12	3.64	-0.000308
3	0.5260	0.8159	0.8558	228.59	154.47	3.52	-0.000198
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000133
5	0.7361	0.8920	0.8803	90.91	167.30	3.32	-0.000253
6	0.8307	0.9270	0.8184	99.47	173.67	3.22	-0.000269
7	0.8918	0.9534	0.8593	105.83	178.70	3.16	-0.000246
8	0.9361	0.9703	0.7523	110.87	181.85	3.11	-0.000189
9	0.9635	0.9819	0.7063	114.01	183.85	3.09	-0.000127
10	0.9819	0.0000	0.0000	116.02	0.00	2.83	-0.000141

REFLUX	ERROR	FEED	FEED CONC.
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116.02	-0.0150	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.51	202.18	6437.43	94437.78
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1322	0.5405	1.0949	82.46	126.69	14.68	-0.000171
2	0.3795	0.7483	0.9354	209.16	146.12	3.64	-0.000272
3	0.5260	0.8159	0.8558	228.58	154.47	3.52	-0.000158
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000101
5	0.7361	0.8920	0.8803	90.90	167.30	3.32	-0.000172
6	0.8307	0.9269	0.8184	99.47	173.67	3.22	-0.000179
7	0.8918	0.9534	0.8593	105.83	178.70	3.16	-0.000161
8	0.9361	0.9703	0.7523	110.87	181.84	3.11	-0.000122
9	0.9635	0.9818	0.7063	114.01	183.85	3.09	-0.000082
10	0.9819	0.0000	0.0000	116.02	0.00	2.83	-0.000089

REFLUX	ERROR	FEED	FEED CONC.
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116.02	-0.0098	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.52	202.19	6437.43	94437.67
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TABLE 1. CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1155	0.2408	1.0949	85.44	126.89	14.61	-0.000118
2	0.3798	0.7483	0.9324	202.16	146.15	3.04	-0.000308
3	0.5260	0.8129	0.8228	228.29	124.47	3.25	-0.000128
4	0.5779	0.8411	1.0225	236.93	128.74	3.47	-0.000118
5	0.7361	0.8920	0.8803	201.90	147.30	3.35	-0.000128
6	0.8307	0.9250	0.8184	99.47	171.27	3.25	-0.000128
7	0.8218	0.9234	0.8293	107.83	178.70	3.16	-0.000161
8	0.9361	0.9703	0.7223	110.87	181.84	3.11	-0.000189
9	0.9632	0.9718	0.7063	114.01	183.48	3.09	-0.000082
10	0.9819	0.0000	0.0000	116.05	0.00	2.83	-0.000141
REFLUX	116.05	-0.0120	120.30	0.2126			
FEED							
ERROR							
STEAM							
RECIRC							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
96.70	187.21	202.18	0.937.43	0.9437.48			

TIME = 12.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1322	0.2408	1.0949	85.44	126.89	14.61	-0.000118
2	0.3798	0.7483	0.9324	202.16	146.15	3.04	-0.000308
3	0.5260	0.8129	0.8228	228.29	124.47	3.25	-0.000128
4	0.5779	0.8411	1.0225	236.93	128.74	3.47	-0.000118
5	0.7361	0.8920	0.8803	201.90	147.30	3.35	-0.000128
6	0.8307	0.9250	0.8184	99.47	171.27	3.25	-0.000128
7	0.8218	0.9234	0.8293	107.83	178.70	3.16	-0.000161
8	0.9361	0.9703	0.7223	110.87	181.84	3.11	-0.000189
9	0.9632	0.9718	0.7063	114.01	183.48	3.09	-0.000082
10	0.9819	0.0000	0.0000	116.05	0.00	2.83	-0.000141
REFLUX	116.05	-0.0098	120.30	0.2126			
FEED							
ERROR							
STEAM							
RECIRC							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
96.70	187.21	202.18	0.937.43	0.9437.48			

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1321	0.5405	1.0949	82.46	126.69	14.68	-0.000141
2	0.3795	0.7483	0.9354	209.16	146.12	3.64	-0.000212
3	0.5260	0.8159	0.8558	228.58	154.47	3.52	-0.000118
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000075
5	0.7361	0.8920	0.8803	90.90	167.30	3.32	-0.000115
6	0.8307	0.9269	0.8184	99.47	173.66	3.22	-0.000117
7	0.8918	0.9534	0.8593	105.83	178.70	3.16	-0.000105
8	0.9361	0.9703	0.7523	110.87	181.84	3.11	-0.000077
9	0.9635	0.9818	0.7063	114.01	183.85	3.09	-0.000053
10	0.9818	0.0000	0.0000	116.01	0.00	2.83	-0.000057

REFLUX	ERROR	FEED	FEED CONC.
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116.01	-0.0063	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.52	202.19	6437.43	94437.56
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TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1321	0.5405	1.0949	82.47	126.69	14.68	-0.000113
2	0.3795	0.7483	0.9354	209.15	146.12	3.64	-0.000169
3	0.5260	0.8159	0.8558	228.58	154.47	3.52	-0.000090
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000052
5	0.7361	0.8920	0.8803	90.90	167.30	3.32	-0.000078
6	0.8307	0.9269	0.8184	99.46	173.66	3.22	-0.000077
7	0.8917	0.9534	0.8593	105.83	178.70	3.16	-0.000069
8	0.9360	0.9703	0.7523	110.86	181.84	3.11	-0.000051
9	0.9635	0.9818	0.7063	114.01	183.85	3.09	-0.000035
10	0.9818	0.0000	0.0000	116.01	0.00	2.83	-0.000036

REFLUX	ERROR	FEED	FEED CONC.
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116.01	-0.0041	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.52	202.19	6437.43	94437.47
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TABLE 1 - CLOSED LOOP - STEP IN FEED RATE - RUN 1

TIME = 85.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HEAT LOAD	DERIVATIVE
1	0.1321	0.2402	1.0049	85.44	156.60	14.68	-0.00011
2	0.3722	0.7483	0.9324	509.15	146.15	3.64	-0.00002
3	0.5256	0.8129	0.8228	224.74	124.74	3.22	-0.00002
4	0.2779	0.8411	1.0225	236.93	128.74	3.47	-0.00002
5	0.7181	0.8920	0.8803	90.90	167.30	4.32	-0.00008
6	0.8307	0.9269	0.8184	99.46	173.66	4.75	-0.00007
7	0.8217	0.9234	0.8293	102.83	178.70	3.16	-0.00001
8	0.9360	0.9703	0.7253	110.86	181.64	4.11	-0.00001
9	0.9632	0.9818	0.7063	114.01	183.82	3.09	-0.00003
10	0.9818	0.9900	0.6000	116.01	0.00	3.63	-0.00002
REFLUX	116.01	-0.0063	120.30	0.2126			
FEED							
ERROR							
STEAM							
RECIRC							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
96.70	187.22	202.19	6437.43	6437.43	94437.26		

TIME = 85.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HEAT LOAD	DERIVATIVE
1	0.1321	0.2402	1.0049	85.44	156.60	14.68	-0.00011
2	0.3722	0.7483	0.9324	509.15	146.15	3.64	-0.00002
3	0.5256	0.8129	0.8228	224.74	124.74	3.22	-0.00002
4	0.2779	0.8411	1.0225	236.93	128.74	3.47	-0.00002
5	0.7181	0.8920	0.8803	90.90	167.30	4.32	-0.00008
6	0.8307	0.9269	0.8184	99.46	173.66	4.75	-0.00007
7	0.8217	0.9234	0.8293	102.83	178.70	3.16	-0.00001
8	0.9360	0.9703	0.7253	110.86	181.64	4.11	-0.00001
9	0.9632	0.9818	0.7063	114.01	183.82	3.09	-0.00003
10	0.9818	0.9900	0.6000	116.01	0.00	3.63	-0.00002
REFLUX	116.01	-0.0041	120.30	0.2126			
FEED							
ERROR							
STEAM							
RECIRC							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
96.70	187.22	202.19	6437.43	6437.43	94437.26		

TABLE U-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 90.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1321	0.5405	1.0949	82.47	126.69	14.68	-0.000088
2	0.3795	0.7483	0.9354	209.15	146.12	3.64	-0.000128
3	0.5260	0.8159	0.8558	228.58	154.46	3.52	-0.000065
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000034
5	0.7361	0.8920	0.8803	90.90	167.30	3.32	-0.000053
6	0.8307	0.9269	0.8184	99.46	173.66	3.22	-0.000050
7	0.8917	0.9534	0.8593	105.83	178.70	3.16	-0.000044
8	0.9360	0.9703	0.7523	110.86	181.84	3.11	-0.000033
9	0.9635	0.9818	0.7063	114.01	183.85	3.09	-0.000021
10	0.9818	0.0000	0.0000	116.01	0.00	2.83	-0.000023

REFLUX	ERROR	FEED	FEED CONC.
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116.01	-0.0027	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.52	202.19	6437.43	94437.41
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TIME = 95.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1321	0.5405	1.0949	82.47	126.69	14.68	-0.000065
2	0.3795	0.7483	0.9354	209.15	146.11	3.64	-0.000095
3	0.5260	0.8159	0.8558	228.58	154.46	3.52	-0.000046
4	0.5779	0.8411	1.0252	236.93	158.74	3.47	-0.000030
5	0.7361	0.8920	0.8803	90.90	167.30	3.32	-0.000037
6	0.8307	0.9269	0.8184	99.46	173.66	3.22	-0.000034
7	0.8917	0.9534	0.8593	105.83	178.70	3.16	-0.000028
8	0.9360	0.9703	0.7523	110.86	181.84	3.11	-0.000021
9	0.9635	0.9818	0.7063	114.00	183.85	3.09	-0.000013
10	0.9818	0.0000	0.0000	116.01	0.00	2.83	-0.000013

REFLUX	ERROR	FEED	FEED CONC.
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116.01	-0.0017	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.52	202.19	6437.43	94437.36
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TABLE 0-11 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 0.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1321	0.2402	1.0249	85.47	156.47	14.88 -0.00000
2	0.3792	0.7483	0.9324	570.18	146.11	3.64 -0.000128
3	0.5260	0.8177	0.8228	528.78	124.40	3.25 -0.00000
4	0.5779	0.8411	1.0222	536.93	128.74	3.47 -0.00003
5	0.7361	0.8020	0.8803	50.40	167.30	3.32 -0.00003
6	0.8307	0.9269	0.8184	57.44	173.60	3.24 -0.00003
7	0.8217	0.9234	0.8223	102.83	178.70	4.16 -0.00000
8	0.9360	0.9703	0.7223	110.86	181.43	3.11 -0.00003
9	0.9632	0.9818	0.7063	114.00	183.60	3.09 -0.00013
10	0.9818	0.9900	0.6900	116.01	0.00	2.83 -0.00014

REFLUX ERROR FEED FEED CONC.

116.01 -0.0017 150.30 0.2126

STEAM FLOW REBOILER TEMPERATURE COEFFICIENT HEAT LOAD

96.70 187.22 502.19 6437.43 94437.41

TIME = 25.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1321	0.2402	1.0249	85.47	156.47	14.88 -0.00000
2	0.3792	0.7483	0.9324	570.18	146.11	3.64 -0.00000
3	0.5260	0.8177	0.8228	528.78	124.40	3.25 -0.00000
4	0.5779	0.8411	1.0222	536.93	128.74	3.47 -0.00003
5	0.7361	0.8020	0.8803	50.40	167.30	3.32 -0.00003
6	0.8307	0.9269	0.8184	57.44	173.60	3.24 -0.00003
7	0.8217	0.9234	0.8223	102.83	178.70	4.16 -0.00000
8	0.9360	0.9703	0.7223	110.86	181.43	3.11 -0.00003
9	0.9632	0.9818	0.7063	114.00	183.60	3.09 -0.00013
10	0.9818	0.9900	0.6900	116.01	0.00	2.83 -0.00014

REFLUX ERROR FEED FEED CONC.

116.01 -0.0017 150.30 0.2126

STEAM FLOW REBOILER TEMPERATURE COEFFICIENT HEAT LOAD

96.70 187.22 502.19 6437.43 94437.41

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0827	0.4575	1.1422	77.93	125.74	14.79	0.000005
2	0.3141	0.6849	0.7897	203.67	144.43	3.70	0.000008
3	0.4739	0.7948	0.9196	222.37	156.73	3.56	0.000005
4	0.5583	0.8287	0.9272	234.66	161.79	3.49	0.000003
5	0.7047	0.8831	0.9434	89.42	170.75	3.35	0.000001
6	0.8105	0.9220	0.9221	98.38	177.73	3.25	0.000000
7	0.8810	0.9484	0.8333	105.36	182.54	3.17	0.000000
8	0.9265	0.9674	0.8243	110.18	185.93	3.13	-0.000001
9	0.9582	0.9818	0.9070	113.57	188.38	3.09	0.000000
10	0.9818	0.0000	0.0000	116.01	0.00	2.83	-0.000000

REFLUX ERROR FEED FEED CONC.

116.01 -0.0017 150.30 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.30	193.76	209.12	6411.37	98423.05
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0551	0.3771	1.1442	64.71	130.80	14.85	-0.231551
2	0.2524	0.6281	0.8242	196.00	150.11	3.74	-0.519012
3	0.4293	0.7675	0.8306	215.68	165.64	3.60	-0.412790
4	0.5359	0.8205	0.9482	231.57	173.50	3.51	-0.199954
5	0.6857	0.8742	0.8966	89.31	182.75	3.37	-0.142402
6	0.7929	0.9180	1.0105	98.71	191.14	3.26	-0.136671
7	0.8731	0.9435	0.7645	107.23	195.92	3.18	-0.061283
8	0.9179	0.9646	0.8714	112.07	199.89	3.13	-0.043688
9	0.9538	0.9809	0.9886	116.09	202.77	3.10	-0.025555
10	0.9813	0.0000	0.0000	118.99	0.00	2.83	-0.026507

REFLUX ERROR FEED FEED CONC.

118.99 0.5752 150.30 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	197.71	214.32	6411.37	106498.16
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TABLE 4-15 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 5

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	FEED-UP	DERIVATIVE
1	0.0825	0.0000	0.0000	118.01	0.00	14.79	0.000002
2	0.3141	0.0000	0.0000	123.67	144.64	3.71	0.000002
3	0.4734	0.0000	0.0000	125.31	152.43	4.44	0.000002
4	0.5284	0.0000	0.0000	124.66	161.79	3.44	0.000002
5	0.5041	0.0000	0.0000	120.72	170.72	8.32	0.000001
6	0.8109	0.0000	0.0000	117.13	177.13	3.22	0.000000
7	0.8414	0.0000	0.0000	102.46	182.46	4.14	0.000000
8	0.9467	0.0000	0.0000	110.18	182.93	8.13	0.000001
9	0.9785	0.0000	0.0000	113.27	188.37	1.09	0.000002
10	0.9818	0.0000	0.0000	118.01	0.00	1.88	0.000000

REFLUX ERROR FEED FEED CONC.

118.01 -0.0017 120.30 0.2126

STEAM REBOILER TEMPERATURE
FLOW STEAM

101.30 101.76 500.15 6411.87 98423.02

TIME = 2.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	FEED-UP	DERIVATIVE
1	0.0221	0.0000	0.0000	118.01	0.00	14.85	0.000002
2	0.3224	0.0000	0.0000	124.67	150.11	4.44	0.000002
3	0.4734	0.0000	0.0000	125.31	152.43	3.60	0.000002
4	0.5284	0.0000	0.0000	124.66	161.79	3.21	0.000002
5	0.5041	0.0000	0.0000	120.72	170.72	8.32	0.000001
6	0.8109	0.0000	0.0000	117.13	177.13	3.22	0.000000
7	0.8414	0.0000	0.0000	102.46	182.46	4.14	0.000000
8	0.9467	0.0000	0.0000	110.18	182.93	8.13	0.000001
9	0.9785	0.0000	0.0000	113.27	188.37	1.09	0.000002
10	0.9818	0.0000	0.0000	118.01	0.00	1.88	0.000000

REFLUX ERROR FEED FEED CONC.

118.01 0.2125 120.30 0.2126

STEAM REBOILER TEMPERATURE
FLOW STEAM

102.90 101.71 514.35 6411.87 106494.16

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0427	0.3343	1.1451	70.80	127.96	14.87	-0.075835
2	0.2246	0.5963	0.8398	198.91	146.58	3.76	-0.221019
3	0.4066	0.7508	0.7852	217.67	163.20	3.62	-0.186082
4	0.5247	0.8162	0.9586	234.45	172.60	3.52	-0.089263
5	0.6793	0.8714	0.8861	93.64	182.00	3.37	-0.034500
6	0.7881	0.9162	1.0105	103.07	190.52	3.27	-0.009608
7	0.8707	0.9424	0.7645	111.61	195.36	3.18	-0.000848
8	0.9165	0.9640	0.8714	116.44	199.40	3.14	0.002170
9	0.9531	0.9806	0.9886	120.48	202.28	3.10	0.001824
10	0.9807	0.0000	0.0000	123.36	0.00	2.83	-0.003969

REFLUX	ERROR	FEED	FEED CONC.
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123.36	1.2239	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	199.52	216.11	6411.37	106401.44
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0389	0.3159	1.1454	73.05	126.79	14.88	-0.025883
2	0.2127	0.5813	0.8465	199.89	145.06	3.77	-0.085562
3	0.3963	0.7425	0.7647	218.22	162.00	3.63	-0.074372
4	0.5194	0.8143	0.9635	235.22	172.19	3.52	-0.038902
5	0.6779	0.8708	0.8861	95.15	181.82	3.38	-0.004443
6	0.7884	0.9164	1.0105	104.78	190.48	3.27	0.010935
7	0.8715	0.9427	0.7645	113.43	195.39	3.18	0.014305
8	0.9173	0.9643	0.8714	118.32	199.45	3.13	0.012786
9	0.9536	0.9808	0.9886	122.37	202.35	3.10	0.008391
10	0.9808	0.0000	0.0000	125.26	0.00	2.83	0.005649

REFLUX	ERROR	FEED	FEED CONC.
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125.26	1.1427	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.07	216.66	6411.37	106371.99
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TABLE 10-19 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 5

TIME = 10.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
2	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
3	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
4	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
5	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
6	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
7	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
8	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
9	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
10	0.0000	0.0000	1.1451	10.80	14.87	-0.000000
REFLUX	1.1451	1.1451	1.1451	1.1451	1.1451	1.1451
FEED	1.1451	1.1451	1.1451	1.1451	1.1451	1.1451
FEED CONC.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD
FLW	REBOILER	STEAM	
102.90	199.25	516.11	6411.37
			106401.44

TIME = 12.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
2	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
3	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
4	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
5	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
6	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
7	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
8	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
9	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
10	0.0000	0.0000	1.1451	10.80	14.88	-0.000000
REFLUX	1.1451	1.1451	1.1451	1.1451	1.1451	1.1451
FEED	1.1451	1.1451	1.1451	1.1451	1.1451	1.1451
FEED CONC.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD
FLW	REBOILER	STEAM	
102.90	200.07	516.11	6411.37
			106371.34

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0375	0.3088	1.1455	73.77	126.34	14.88	-0.010665
2	0.2080	0.5753	0.8486	200.14	144.51	3.77	-0.034219
3	0.3921	0.7394	0.7596	218.33	161.58	3.63	-0.033111
4	0.5175	0.8135	0.9638	235.43	172.06	3.53	-0.011119
5	0.6779	0.8708	0.8861	95.62	181.81	3.38	0.003089
6	0.7893	0.9167	1.0105	105.37	190.58	3.27	0.010692
7	0.8726	0.9432	0.7645	114.12	195.55	3.18	0.012158
8	0.9183	0.9647	0.8714	119.08	199.64	3.13	0.010724
9	0.9543	0.9811	0.9886	123.16	202.55	3.10	0.007312
10	0.9810	0.0000	0.0000	126.06	0.00	2.83	0.006309

REFLUX ERROR FEED FEED CONC.

126.06 0.8645 150.30 0.5156

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.28	216.87	6411.37	106360.48
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0369	0.3060	1.1455	74.09	126.17	14.89	-0.003740
2	0.2062	0.5727	0.8486	200.27	144.27	3.77	-0.011348
3	0.3904	0.7383	0.7596	218.38	161.44	3.64	-0.010197
4	0.5170	0.8133	0.9638	235.56	172.03	3.53	-0.001850
5	0.6783	0.8709	0.8861	95.85	181.86	3.38	0.006322
6	0.7902	0.9170	1.0105	105.67	190.68	3.27	0.009646
7	0.8735	0.9436	0.7645	114.48	195.69	3.18	0.009448
8	0.9191	0.9651	0.8714	119.49	199.80	3.13	0.008001
9	0.9548	0.9813	0.9886	123.58	202.72	3.10	0.005415
10	0.9813	0.0000	0.0000	126.50	0.00	2.83	0.004888

REFLUX ERROR FEED FEED CONC.

126.50 0.6180 150.30 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.37	216.95	6411.37	106355.96
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TABLE U-15 CLOSED LOOP - STEP IN STEAM FLOW RATE -

TIME = 20.0

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.015	0.308	1.145	73.77	144.21	1.77	-0.01000
2	0.208	0.777	0.848	101.14	144.21	1.77	-0.04219
3	0.304	0.738	0.729	117.38	144.21	1.77	-0.03111
4	0.217	0.813	0.983	132.25	144.21	1.77	-0.01119
5	0.678	0.870	0.881	157.82	144.21	1.77	-0.00308
6	0.773	0.917	1.010	174.48	144.21	1.77	-0.01000
7	0.873	0.943	0.765	114.48	144.21	1.77	-0.01218
8	0.919	0.961	0.871	119.49	144.21	1.77	-0.01254
9	0.944	0.981	0.988	133.28	144.21	1.77	-0.00313
10	0.981	0.990	0.990	157.20	144.21	1.77	-0.00300
REFLUX	156.00	150.30	0.515				
STEAM							
FLW	100.00	200.28	216.87	641.37			
TEMPERATURE							
REBOILER							
STEAM							
COEFFICIENT							
HEAT LOAD							

TIME = 25.0

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.036	0.308	1.145	74.09	158.17	14.89	-0.00374
2	0.208	0.777	0.848	100.27	144.21	3.77	-0.01348
3	0.304	0.738	0.729	118.38	161.44	3.24	-0.01010
4	0.217	0.813	0.983	132.25	172.03	1.23	-0.00180
5	0.678	0.870	0.881	157.82	181.95	1.38	-0.00322
6	0.773	0.917	1.010	174.48	190.69	1.27	-0.00446
7	0.873	0.943	0.765	114.48	187.69	1.18	-0.00444
8	0.919	0.961	0.871	119.49	197.73	1.13	-0.00201
9	0.944	0.981	0.988	133.28	202.72	1.11	-0.00243
10	0.981	0.990	0.990	157.20	0.00	1.88	-0.00446
REFLUX	156.20	150.30	0.515				
STEAM							
FLW	100.00	200.37	216.92	641.37			
TEMPERATURE							
REBOILER							
STEAM							
COEFFICIENT							
HEAT LOAD							

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0367	0.3053	1.1455	74.26	126.12	14.89	-0.000302
2	0.2058	0.5721	0.8486	200.38	144.22	3.77	0.000341
3	0.3901	0.7381	0.7596	218.48	161.42	3.64	0.001585
4	0.5171	0.8133	0.9638	235.67	172.05	3.53	0.002785
5	0.6789	0.8711	0.8861	96.00	181.91	3.37	0.007305
6	0.7909	0.9173	1.0105	105.86	190.77	3.27	0.008314
7	0.8742	0.9439	0.7645	114.70	195.81	3.18	0.007325
8	0.9196	0.9653	0.8714	119.74	199.92	3.13	0.005956
9	0.9552	0.9815	0.9886	123.85	202.86	3.09	0.003948
10	0.9814	0.0000	0.0000	126.78	0.00	2.83	0.003590

REFLUX	ERROR	FEED	FEED CONC.
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126.78	0.4335	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.39	216.98	6411.37	106354.74
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TIME = 35.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0368	0.3056	1.1455	74.33	126.14	14.89	0.001257
2	0.2061	0.5725	0.8486	200.46	144.25	3.77	0.005492
3	0.3905	0.7383	0.7596	218.57	161.45	3.64	0.006648
4	0.5174	0.8134	0.9638	235.76	172.08	3.53	0.004527
5	0.6795	0.8713	0.8861	96.10	181.97	3.37	0.006939
6	0.7915	0.9175	1.0105	105.98	190.84	3.26	0.006815
7	0.8747	0.9441	0.7645	114.84	195.90	3.18	0.005577
8	0.9201	0.9655	0.8714	119.89	200.02	3.13	0.004385
9	0.9555	0.9816	0.9886	124.01	202.96	3.09	0.002850
10	0.9816	0.0000	0.0000	126.95	0.00	2.83	0.002602

REFLUX	ERROR	FEED	FEED CONC.
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126.95	0.2989	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.38	216.97	6411.37	106355.13
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TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 5

TIME = 30.00

PLATE CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

156.78 0.4332 150.30 0.2126

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

102.90 210.30 216.98 241.37 102.90

TIME = 35.00

PLATE CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

156.92 0.2986 150.30 0.2126

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

102.90 210.30 216.97 241.37 102.90

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0369	0.3063	1.1455	74.34	126.18	14.89	0.001746
2	0.2066	0.5732	0.8486	200.52	144.32	3.77	0.006933
3	0.3911	0.7386	0.7596	218.65	161.50	3.63	0.007898
4	0.5178	0.8136	0.9638	235.83	172.12	3.53	0.004647
5	0.6800	0.8715	0.8861	96.14	182.03	3.37	0.005859
6	0.7921	0.9177	1.0105	106.04	190.90	3.26	0.005282
7	0.8751	0.9442	0.7645	114.92	195.98	3.18	0.004113
8	0.9204	0.9656	0.8714	119.98	200.09	3.13	0.003153
9	0.9557	0.9817	0.9886	124.10	203.04	3.09	0.002020
10	0.9816	0.0000	0.0000	127.04	0.00	2.83	0.001859

REFLUX	ERROR	FEED	FEED CONC.
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127.04	0.2020	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.36	216.95	6411.37	106356.19
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0371	0.3071	1.1455	74.33	126.23	14.89	0.001692
2	0.2072	0.5740	0.8486	200.55	144.39	3.77	0.006511
3	0.3918	0.7390	0.7596	218.71	161.56	3.63	0.007264
4	0.5182	0.8137	0.9638	235.87	172.16	3.53	0.004020
5	0.6804	0.8716	0.8861	96.17	182.07	3.37	0.004568
6	0.7924	0.9179	1.0105	106.08	190.95	3.26	0.003898
7	0.8754	0.9444	0.7645	114.95	196.03	3.18	0.002928
8	0.9206	0.9657	0.8714	120.03	200.15	3.13	0.002205
9	0.9558	0.9817	0.9886	124.15	203.10	3.09	0.001395
10	0.9817	0.0000	0.0000	127.09	0.00	2.83	0.001299

REFLUX	ERROR	FEED	FEED CONC.
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127.09	0.1336	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.34	216.93	6411.37	106357.34
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TABLE 1 - CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 5

TIME = 40.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
REFLUX	157.04	0.2020	150.30	0.2120	FEED CONC.		
FEED							
ERROR							
STEAM FLOW	100.00	200.30	210.40	211.30	100.30		
1	0.0369	0.3743	1.1422	14.34	150.10	14.80	0.00140
2	0.2584	0.2732	0.8486	100.12	144.10	14.80	0.00140
3	0.3911	0.7190	0.7200	210.11	141.10	14.80	0.00140
4	0.2178	0.8180	0.4038	230.07	132.10	14.80	0.00140
5	0.6800	0.8712	0.8001	20.14	182.07	14.80	0.00140
6	0.7021	0.9177	1.0102	100.00	100.00	14.80	0.00140
7	0.8721	0.9442	0.7042	114.92	100.00	14.80	0.00140
8	0.9204	0.9640	0.8714	150.03	200.10	14.80	0.00140
9	0.9220	0.9817	0.9880	154.10	203.10	14.80	0.00140
10	0.9810	0.0000	0.0000	157.04	0.00	14.80	0.00140

TIME = 45.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
REFLUX	157.04	1.1330	150.30	0.2120	FEED CONC.		
FEED							
ERROR							
STEAM FLOW	100.00	200.34	210.43	211.30	100.30		
1	0.0371	0.3071	1.1422	14.13	150.20	14.80	0.00140
2	0.2575	0.2740	0.8486	100.12	144.10	14.80	0.00140
3	0.3910	0.7390	0.7200	210.11	141.10	14.80	0.00140
4	0.2180	0.8137	0.4038	230.07	132.10	14.80	0.00140
5	0.6804	0.8714	0.8001	20.14	182.07	14.80	0.00140
6	0.7024	0.9170	1.0102	100.00	100.00	14.80	0.00140
7	0.8724	0.9444	0.7042	114.92	100.00	14.80	0.00140
8	0.9206	0.9627	0.8714	150.03	200.10	14.80	0.00140
9	0.9220	0.9817	0.9880	154.10	203.10	14.80	0.00140
10	0.9810	0.0000	0.0000	157.04	0.00	14.80	0.00140

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0372	0.3078	1.1455	74.31	126.27	14.88	0.001420
2	0.2077	0.5747	0.8486	200.57	144.45	3.77	0.005384
3	0.3923	0.7393	0.7596	218.75	161.60	3.63	0.005936
4	0.5185	0.8139	0.9638	235.90	172.18	3.52	0.003181
5	0.6808	0.8718	0.8861	96.18	182.10	3.37	0.003375
6	0.7927	0.9180	1.0105	106.09	190.98	3.26	0.002765
7	0.8756	0.9445	0.7645	114.97	196.07	3.18	0.002022
8	0.9208	0.9658	0.8714	120.05	200.19	3.13	0.001499
9	0.9559	0.9818	0.9886	124.17	203.14	3.09	0.000942
10	0.9818	0.0000	0.0000	127.12	0.00	2.83	0.000885

REFLUX	ERROR	FEED	FEED CONC.
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127.12	0.0865	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.32	216.91	6411.37	106358.41
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0373	0.3083	1.1455	74.28	126.30	14.88	0.001096
2	0.2081	0.5752	0.8486	200.58	144.50	3.77	0.004115
3	0.3928	0.7396	0.7596	218.78	161.64	3.63	0.004507
4	0.5187	0.8139	0.9638	235.92	172.20	3.52	0.002357
5	0.6810	0.8719	0.8861	96.18	182.13	3.37	0.002388
6	0.7929	0.9180	1.0105	106.10	191.01	3.26	0.001895
7	0.8758	0.9445	0.7645	114.98	196.09	3.18	0.001356
8	0.9209	0.9658	0.8714	120.06	200.21	3.13	0.000995
9	0.9560	0.9818	0.9886	124.18	203.16	3.09	0.000621
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000590

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0548	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.30	216.89	6411.37	106359.25
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TABLE 1 - CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 22.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9818	0.0000	0.0000	157.15	0.00	5.88	0.000885
9	0.9529	0.9818	0.9886	154.17	503.14	3.03	0.000945
8	0.9239	0.9529	0.8714	150.05	500.19	3.17	0.001409
7	0.8758	0.9239	0.7645	114.97	196.07	3.18	0.005057
6	0.7529	0.8758	1.0105	106.10	191.01	1.56	0.001895
5	0.6810	0.8719	0.8861	96.18	195.13	3.37	0.002381
4	0.5187	0.8139	0.9698	835.95	175.77	3.55	0.005357
3	0.3919	0.7399	0.7596	818.78	161.64	1.63	0.004057
2	0.5081	0.5755	0.8486	500.58	144.50	3.77	0.004119
1	0.0373	0.3083	1.1455	74.58	194.10	14.98	0.001095
REFLUX	0.0548	150.30	1.5156				
FEED							
ERROR							
FEED CONC.							
STEAM FLOW	109.90	500.30	516.89				
REFRIGERANT							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TIME = 22.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
10	0.9818	0.0000	0.0000	157.15	0.00	5.88	0.000990
9	0.9529	0.9818	0.9886	154.18	503.14	3.03	0.000951
8	0.9239	0.9529	0.8714	150.06	500.51	3.13	0.005057
7	0.8758	0.9239	0.7645	114.98	196.07	3.18	0.001356
6	0.7529	0.8758	1.0105	106.10	191.01	1.56	0.001895
5	0.6810	0.8719	0.8861	96.18	195.13	3.37	0.002381
4	0.5187	0.8139	0.9698	835.95	175.77	3.55	0.005357
3	0.3919	0.7399	0.7596	818.78	161.64	1.63	0.004057
2	0.5081	0.5755	0.8486	500.58	144.50	3.77	0.004119
1	0.0373	0.3083	1.1455	74.58	194.10	14.98	0.001095
REFLUX	0.0548	150.30	1.5156				
FEED							
ERROR							
FEED CONC.							
STEAM FLOW	109.90	500.30	516.89				
REFRIGERANT							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0374	0.3088	1.1455	74.26	126.33	14.88	0.000801
2	0.2084	0.5757	0.8486	200.59	144.54	3.77	0.002987
3	0.3931	0.7398	0.7596	218.80	161.67	3.63	0.003255
4	0.5189	0.8140	0.9638	235.93	172.22	3.52	0.001676
5	0.6812	0.8719	0.8861	96.17	182.14	3.37	0.001635
6	0.7930	0.9181	1.0105	106.10	191.03	3.26	0.001265
7	0.8759	0.9446	0.7645	114.98	196.11	3.18	0.000887
8	0.9209	0.9658	0.8714	120.06	200.23	3.13	0.000644
9	0.9560	0.9818	0.9886	124.18	203.18	3.09	0.000400
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000384

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0340	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.29	216.88	6411.37	106359.87
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0374	0.3091	1.1455	74.25	126.35	14.88	0.000565
2	0.2086	0.5759	0.8486	200.59	144.57	3.77	0.002101
3	0.3933	0.7399	0.7596	218.81	161.69	3.63	0.002278
4	0.5190	0.8141	0.9638	235.93	172.23	3.52	0.001159
5	0.6813	0.8720	0.8861	96.17	182.15	3.37	0.001095
6	0.7931	0.9181	1.0105	106.09	191.04	3.26	0.000829
7	0.8759	0.9446	0.7645	114.98	196.12	3.18	0.000571
8	0.9210	0.9659	0.8714	120.06	200.24	3.13	0.000410
9	0.9561	0.9818	0.9886	124.18	203.19	3.09	0.000254
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000248

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0206	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.28	216.87	6411.37	106360.33
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TABLE 1-17. CLOSED LOOP - STEP 1. STEAM FLOW RATE - 0.0000

TIME = 00.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1455	14.55	14.55	14.55	0.0000
2	0.0000	0.0000	0.8486	200.29	144.24	14.55	0.0000
3	0.0000	0.0000	0.7296	218.81	161.61	14.55	0.0000
4	0.0000	0.0000	0.7296	232.93	175.23	14.55	0.0000
5	0.0000	0.0000	0.8486	26.17	182.14	14.55	0.0000
6	0.0000	0.0000	1.0102	106.10	191.03	14.55	0.0000
7	0.0000	0.0000	0.7296	114.28	196.11	14.55	0.0000
8	0.0000	0.0000	0.8486	120.06	200.29	14.55	0.0000
9	0.0000	0.0000	0.8486	124.18	203.19	14.55	0.0000
10	0.0000	0.0000	0.0000	127.13	204.00	14.55	0.0000

REFLUX ERROR FEED FEED CONC.

127.13 0.0000 120.34 0.2129

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

102.90 102.90 102.90 102.90

TIME = 00.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1455	14.55	14.55	14.55	0.0000
2	0.0000	0.0000	0.8486	200.29	144.24	14.55	0.0000
3	0.0000	0.0000	0.7296	218.81	161.61	14.55	0.0000
4	0.0000	0.0000	0.7296	232.93	175.23	14.55	0.0000
5	0.0000	0.0000	0.8486	26.17	182.14	14.55	0.0000
6	0.0000	0.0000	1.0102	106.10	191.03	14.55	0.0000
7	0.0000	0.0000	0.7296	114.28	196.11	14.55	0.0000
8	0.0000	0.0000	0.8486	120.06	200.29	14.55	0.0000
9	0.0000	0.0000	0.8486	124.18	203.19	14.55	0.0000
10	0.0000	0.0000	0.0000	127.13	204.00	14.55	0.0000

REFLUX ERROR FEED FEED CONC.

127.13 0.0000 120.34 0.2129

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

102.90 102.90 102.90 102.90

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3093	1.1455	74.23	126.36	14.88	0.000387
2	0.2087	0.5761	0.8486	200.59	144.58	3.77	0.001433
3	0.3935	0.7400	0.7596	218.82	161.70	3.63	0.001547
4	0.5191	0.8141	0.9638	235.93	172.24	3.52	0.000783
5	0.6813	0.8720	0.8861	96.17	182.16	3.37	0.000717
6	0.7932	0.9181	1.0105	106.09	191.04	3.26	0.000531
7	0.8760	0.9446	0.7645	114.97	196.13	3.18	0.000360
8	0.9210	0.9659	0.8714	120.06	200.25	3.13	0.000256
9	0.9561	0.9818	0.9886	124.18	203.20	3.09	0.000158
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000157

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0122	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.28	216.87	6411.37	106360.63
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3094	1.1455	74.23	126.37	14.88	0.000256
2	0.2088	0.5763	0.8486	200.59	144.60	3.77	0.000946
3	0.3936	0.7401	0.7596	218.82	161.71	3.63	0.001019
4	0.5191	0.8141	0.9638	235.94	172.24	3.52	0.000510
5	0.6814	0.8720	0.8861	96.17	182.17	3.37	0.000456
6	0.7932	0.9181	1.0105	106.09	191.05	3.26	0.000333
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000222
8	0.9210	0.9659	0.8714	120.06	200.25	3.13	0.000156
9	0.9561	0.9818	0.9886	124.18	203.21	3.09	0.000097
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000099

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0071	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106360.84
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TABLE 10-11 CLOSED LOOP - STEP IN STEADY STATE - 100%

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT -	DERIVATIVE
1	0.0175	0.3093	1.1455	74.23	156.36	14.88	0.00000
2	0.0287	0.2761	0.8486	80.00	144.00	8.77	0.00000
3	0.0373	0.7401	0.7596	218.85	161.70	3.63	0.00000
4	0.0191	0.8141	0.9638	335.24	175.24	3.25	0.00000
5	0.0813	0.8750	0.9461	96.17	185.17	3.37	0.00000
6	0.7935	0.9181	1.0105	100.00	191.00	3.27	0.00000
7	0.8746	0.9446	0.7645	114.97	196.14	3.18	0.00000
8	0.9210	0.9659	0.8714	150.06	200.06	3.13	0.00000
9	0.9561	0.9818	0.9886	154.18	203.21	3.09	0.00000
10	0.9818	0.0000	0.0000	157.13	0.00	3.04	0.00000

REFLUX 157.13 ERROR 150.30 FEED CONC. 0.5150

STEAM FLOW RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD
102.00 500.58 516.87 6411.37 106360.63

TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT -	DERIVATIVE
1	0.0373	0.3093	1.1455	74.23	156.36	14.88	0.00000
2	0.0287	0.2763	0.8486	80.00	144.00	8.77	0.00000
3	0.0373	0.7401	0.7596	218.85	161.70	3.63	0.00000
4	0.0191	0.8141	0.9638	335.24	175.24	3.25	0.00000
5	0.0814	0.8750	0.9461	96.17	185.17	3.37	0.00000
6	0.7935	0.9181	1.0105	100.00	191.00	3.27	0.00000
7	0.8746	0.9446	0.7645	114.97	196.14	3.18	0.00000
8	0.9210	0.9659	0.8714	150.06	200.06	3.13	0.00000
9	0.9561	0.9818	0.9886	154.18	203.21	3.09	0.00000
10	0.9818	0.0000	0.0000	157.13	0.00	3.04	0.00000

REFLUX 157.13 ERROR 150.30 FEED CONC. 0.5150

STEAM FLOW RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOAD
102.00 500.58 516.87 6411.37 106360.63

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3095	1.1455	74.22	126.37	14.88	0.000167
2	0.2089	0.5764	0.8486	200.59	144.61	3.77	0.000612
3	0.3936	0.7401	0.7596	218.83	161.72	3.63	0.000661
4	0.5191	0.8141	0.9638	235.94	172.24	3.52	0.000330
5	0.6814	0.8720	0.8861	96.16	182.17	3.37	0.000286
6	0.7932	0.9181	1.0105	106.09	191.05	3.26	0.000205
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000134
8	0.9210	0.9659	0.8714	120.06	200.26	3.13	0.000095
9	0.9561	0.9818	0.9886	124.18	203.21	3.09	0.000059
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000063

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0040	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106361.00
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TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3095	1.1455	74.22	126.38	14.88	0.000108
2	0.2089	0.5764	0.8486	200.59	144.61	3.77	0.000395
3	0.3937	0.7402	0.7596	218.83	161.72	3.63	0.000424
4	0.5192	0.8141	0.9638	235.94	172.25	3.52	0.000211
5	0.6814	0.8720	0.8861	96.16	182.17	3.37	0.000182
6	0.7932	0.9182	1.0105	106.09	191.05	3.26	0.000128
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000084
8	0.9210	0.9659	0.8714	120.06	200.26	3.13	0.000058
9	0.9561	0.9818	0.9886	124.17	203.21	3.09	0.000036
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000043

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0022	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106361.07
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TABLE -12 CLOSED LOOP - STEP IN STEAM FLOW RATE - 1

TIME = 85.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0877	0.0877	1.1422	74.22	126.37	14.77	0.00015
2	0.2089	0.2089	0.8486	200.27	144.61	3.77	0.00061
3	0.3237	0.3237	0.7402	218.83	161.72	3.77	0.00045
4	0.2192	0.2192	0.9638	232.94	172.75	3.77	0.00011
5	0.6814	0.6814	0.8861	96.16	182.17	3.77	0.00018
6	0.7232	0.7232	1.0102	102.04	191.02	3.77	0.00012
7	0.8160	0.8160	0.7642	114.77	196.14	3.18	0.00087
8	0.9210	0.9210	0.8714	120.26	200.26	3.18	0.00058
9	0.9261	0.9261	0.9886	124.17	203.21	3.77	0.00036
10	0.9818	0.9818	0.0000	127.13	0.00	2.77	0.00043
REFLUX	ERROR	FLED	FEDD	FEED CONC.			
127.13	0.0040	127.30	0.2126				
FLW	REBOILER	STEAM	TEMPERATURE	COEFFICIENT			
102.90	200.27	214.84	6411.37	HEAT LOAD			
102.90	200.27	214.84	6411.37	100361.07			

TIME = 85.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0877	0.0877	1.1422	74.22	126.37	14.77	0.00018
2	0.2089	0.2089	0.8486	200.27	144.61	3.77	0.00032
3	0.3237	0.3237	0.7402	218.83	161.72	3.77	0.00424
4	0.2192	0.2192	0.9638	232.94	172.75	3.77	0.00011
5	0.6814	0.6814	0.8861	96.16	182.17	3.77	0.00018
6	0.7232	0.7232	1.0102	102.04	191.02	3.77	0.00012
7	0.8160	0.8160	0.7642	114.77	196.14	3.18	0.00087
8	0.9210	0.9210	0.8714	120.26	200.26	3.18	0.00058
9	0.9261	0.9261	0.9886	124.17	203.21	3.77	0.00036
10	0.9818	0.9818	0.0000	127.13	0.00	2.77	0.00043
REFLUX	ERROR	FLED	FEDD	FEED CONC.			
127.13	0.0022	120.80	0.2126				
FLW	REBOILER	STEAM	TEMPERATURE	COEFFICIENT			
102.90	200.27	214.84	6411.37	HEAT LOAD			
102.90	200.27	214.84	6411.37	100361.07			

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 90.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3096	1.1455	74.21	126.38	14.88	0.000068
2	0.2089	0.5765	0.8486	200.59	144.61	3.77	0.000249
3	0.3937	0.7402	0.7596	218.83	161.72	3.63	0.000266
4	0.5192	0.8141	0.9638	235.94	172.25	3.52	0.000134
5	0.6814	0.8720	0.8861	96.16	182.17	3.37	0.000111
6	0.7932	0.9182	1.0105	106.09	191.05	3.26	0.000077
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000050
8	0.9210	0.9659	0.8714	120.06	200.26	3.13	0.000035
9	0.9561	0.9818	0.9886	124.17	203.21	3.09	0.000021
10	0.9818	0.0000	0.0000	127.13	0.00	2.83	0.000029

REFLUX	ERROR	FEED	FEED CONC.
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127.13	0.0011	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106361.13
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TIME = 95.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3096	1.1455	74.21	126.38	14.88	0.000040
2	0.2089	0.5765	0.8486	200.59	144.62	3.77	0.000145
3	0.3937	0.7402	0.7596	218.83	161.72	3.63	0.000154
4	0.5192	0.8141	0.9638	235.94	172.25	3.52	0.000075
5	0.6815	0.8720	0.8861	96.16	182.17	3.37	0.000060
6	0.7933	0.9182	1.0105	106.08	191.05	3.26	0.000041
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000027
8	0.9210	0.9659	0.8714	120.05	200.26	3.13	0.000019
9	0.9561	0.9818	0.9886	124.17	203.21	3.09	0.000014
10	0.9818	0.0000	0.0000	127.12	0.00	2.83	0.000018

REFLUX	ERROR	FEED	FEED CONC.
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127.12	0.0005	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106361.16
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TABLE 9-15 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 5

TIME = 91.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0158	0.0000	1.1425	14.21	14.21	0.00000
2	0.0158	0.0000	0.8488	200.29	144.61	0.00000
3	0.0158	0.0000	0.7402	218.83	161.75	0.00000
4	0.0158	0.0000	0.8141	232.44	175.25	0.00000
5	0.0158	0.0000	0.8881	246.14	182.17	0.00000
6	0.0158	0.0000	1.0102	106.08	191.02	0.00000
7	0.0158	0.0000	0.7446	114.27	196.14	0.00000
8	0.0158	0.0000	0.8714	120.02	203.21	0.00000
9	0.0158	0.0000	0.9886	124.17	203.21	0.00000
10	0.0158	0.0000	0.0000	124.17	0.00	0.00000

REFLUX ERROR FEED FEED CONC.

127.12 0.0002 120.30 0.0126

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOSS

102.90 200.27 216.86 6411.37 100361.16

TIME = 92.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0158	0.0000	1.1425	14.21	14.21	0.00000
2	0.0158	0.0000	0.8488	200.29	144.61	0.00000
3	0.0158	0.0000	0.7402	218.83	161.75	0.00000
4	0.0158	0.0000	0.8141	232.44	175.25	0.00000
5	0.0158	0.0000	0.8881	246.14	182.17	0.00000
6	0.0158	0.0000	1.0102	106.08	191.02	0.00000
7	0.0158	0.0000	0.7446	114.27	196.14	0.00000
8	0.0158	0.0000	0.8714	120.02	203.21	0.00000
9	0.0158	0.0000	0.9886	124.17	203.21	0.00000
10	0.0158	0.0000	0.0000	124.17	0.00	0.00000

REFLUX ERROR FEED FEED CONC.

127.12 0.0002 120.30 0.0126

STEAM RECYCLER STEAM TEMPERATURE COEFFICIENT HEAT LOSS

102.90 200.27 216.86 6411.37 100361.16

TABLE U-12 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 100.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0375	0.3096	1.1455	74.21	126.38	14.88	0.000026
2	0.2090	0.5765	0.8486	200.59	144.62	3.77	0.000096
3	0.3937	0.7402	0.7596	218.83	161.73	3.63	0.000097
4	0.5192	0.8142	0.9638	235.94	172.25	3.52	0.000054
5	0.6815	0.8720	0.8861	96.16	182.17	3.37	0.000039
6	0.7933	0.9182	1.0105	106.08	191.05	3.26	0.000031
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000016
8	0.9210	0.9659	0.8714	120.05	200.26	3.13	0.000015
9	0.9561	0.9818	0.9886	124.17	203.21	3.09	0.000008
10	0.9818	0.0000	0.0000	127.12	0.00	2.83	0.000014

REFLUX ERROR FEED FEED CONC.

127.12 0.0002 150.30 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106361.19
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TIME = 105.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0375	0.3096	1.1455	74.21	126.38	14.88	0.000025
2	0.2090	0.5765	0.8486	200.59	144.62	3.77	0.000091
3	0.3937	0.7402	0.7596	218.83	161.73	3.63	0.000085
4	0.5192	0.8142	0.9638	235.94	172.25	3.52	0.000060
5	0.6815	0.8720	0.8862	96.16	182.17	3.37	0.000044
6	0.7933	0.9182	1.0105	106.08	191.05	3.26	0.000040
7	0.8760	0.9446	0.7645	114.97	196.14	3.18	0.000015
8	0.9210	0.9659	0.8714	120.05	200.26	3.13	0.000021
9	0.9561	0.9818	0.9886	124.17	203.21	3.09	0.000009
10	0.9818	0.0000	0.0000	127.12	0.00	2.83	0.000014

REFLUX ERROR FEED FEED CONC.

127.12 0.0002 150.30 0.5156

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.86	6411.37	106361.21
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TABLE U-1 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 5

TIME = 100.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR

1	0.0375	0.3096	1.1452	74.21	156.38	10.88	0.00008
2	0.0375	0.2766	0.8486	500.50	144.62	8.77	0.00008
3	0.3237	0.7402	0.7296	218.83	161.73	8.63	0.00008
4	0.2192	0.8142	0.9638	232.94	172.22	8.52	0.00008
5	0.6812	0.8720	0.8862	96.16	182.17	8.37	0.00008
6	0.7233	0.9182	1.0102	106.08	191.02	8.28	0.00008
7	0.8760	0.9446	0.7642	114.97	196.14	8.18	0.00008
8	0.9210	0.9629	0.8714	120.69	200.24	8.13	0.00008
9	0.9261	0.9616	0.9886	124.17	204.21	8.09	0.00008
10	0.9618	0.0000	0.0000	127.12	0.00	8.03	0.00008

REFLUX ERROR FEED FEED

127.12 0.0002 120.30 0.2126

STEAM TEMPERATURE

FLW RECHLER STEAM

102.90 200.27 216.86 6411.37 100801.19

COEFFICIENT HEAT LOAD

TIME = 102.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR

1	0.0375	0.3096	1.1452	74.21	156.38	10.88	0.00008
2	0.0375	0.2766	0.8486	500.50	144.62	8.77	0.00008
3	0.3237	0.7402	0.7296	218.83	161.73	8.63	0.00008
4	0.2192	0.8142	0.9638	232.94	172.22	8.52	0.00008
5	0.6812	0.8720	0.8862	96.16	182.17	8.37	0.00008
6	0.7233	0.9182	1.0102	106.08	191.02	8.28	0.00008
7	0.8760	0.9446	0.7642	114.97	196.14	8.18	0.00008
8	0.9210	0.9629	0.8714	120.69	200.24	8.13	0.00008
9	0.9261	0.9616	0.9886	124.17	204.21	8.09	0.00008
10	0.9618	0.0000	0.0000	127.12	0.00	8.03	0.00008

REFLUX ERROR FEED FEED

127.12 0.0002 120.30 0.2126

STEAM TEMPERATURE

FLW RECHLER STEAM

102.90 200.27 216.86 6411.37 100801.19

COEFFICIENT HEAT LOAD

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0179	0.2333	1.1971	71.63	111.99	14.92	0.000002
2	0.1493	0.4295	0.7189	183.61	122.34	3.81	0.000005
3	0.2775	0.6626	0.8434	193.97	139.85	3.72	0.000005
4	0.4442	0.7819	0.9576	211.48	152.13	3.59	0.000003
5	0.5815	0.8338	0.8557	73.76	159.06	3.47	0.000001
6	0.7012	0.8852	1.0297	80.69	167.10	3.35	0.000000
7	0.8100	0.9203	0.8718	88.72	172.88	3.25	-0.000000
8	0.8787	0.9479	0.8601	94.51	177.52	3.18	-0.000001
9	0.9300	0.9704	0.9377	99.15	181.34	3.12	-0.000002
10	0.9704	0.0000	0.0000	102.97	0.00	2.84	-0.000000

REFLUX	ERROR	FEED	FEED CONC.
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102.97	0.0002	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	203.39	221.07	5537.24	97866.29
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0341	0.3120	1.1779	85.31	116.58	14.89	0.138102
2	0.2050	0.5278	0.7121	201.62	129.37	3.77	0.460395
3	0.3499	0.7101	0.7662	214.10	145.54	3.67	0.545327
4	0.4866	0.8015	0.9728	229.84	156.41	3.55	0.273645
5	0.6340	0.8525	0.8418	90.48	163.94	3.42	0.368274
6	0.7454	0.8961	0.8897	97.66	171.15	3.31	0.315183
7	0.8341	0.9313	0.9167	104.55	177.40	3.22	0.157679
8	0.8987	0.9559	0.8434	110.64	181.77	3.15	0.127731
9	0.9423	0.9738	0.8239	114.88	184.84	3.11	0.079056
10	0.9729	0.0000	0.0000	117.86	0.00	2.84	0.059621

REFLUX	ERROR	FEED	FEED CONC.
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117.86	1.9288	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	200.78	218.49	5537.24	98074.01
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TABLE 9-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT. - 100%

TIME = 2.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0179	0.2333	1.1971	71.63	111.99	14.95	0.00000
2	0.01493	0.4525	0.7189	183.61	152.34	4.41	0.00000
3	0.02777	0.6434	0.8434	193.97	170.45	2.75	0.00000
4	0.04444	0.7819	0.9776	211.48	152.13	3.29	0.00000
5	0.05817	0.8338	0.8257	177.76	150.06	3.47	0.00001
6	0.07012	0.8452	1.2307	80.69	164.10	3.35	0.00000
7	0.08112	0.7203	0.9718	88.75	172.84	3.25	-0.00000
8	0.08787	0.9479	0.8601	94.21	177.25	3.18	-0.00001
9	0.09300	0.9704	0.7377	99.15	181.34	3.15	-0.00000
10	0.09704	0.0000	0.0000	102.97	0.00	2.84	-0.00000

REFLUX ERROR FEED FEED CONC.

102.97 0.0000 150.00 0.2156

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLW RECYCLER STEAM

101.20 204.39 251.07 2237.24 10000.01

TIME = 2.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0341	0.8124	1.1779	82.31	110.74	14.49	0.13810
2	0.0252	0.7278	0.7151	241.44	120.77	3.77	0.46037
3	0.03429	0.7101	0.7662	214.17	142.24	4.67	0.24327
4	0.04866	0.8012	0.9728	229.84	144.41	3.22	0.23865
5	0.06340	0.8222	0.8418	204.48	163.94	3.45	0.36827
6	0.07424	0.8701	0.8897	27.66	171.12	3.31	0.31111
7	0.08341	0.9313	0.9167	104.22	177.40	3.28	0.12567
8	0.08687	0.9229	0.8434	110.64	181.77	3.15	0.12737
9	0.09423	0.9738	0.8239	114.88	184.44	3.11	0.07006
10	0.09729	0.0000	0.0000	117.86	0.00	2.84	0.02962

REFLUX ERROR FEED FEED CONC.

117.86 1.2288 150.00 0.2156

STEAM TEMPERATURE COEFFICIENT HEAT LOAD
FLW RECYCLER STEAM

101.20 200.77 211.44 2237.24 10000.01

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0415	0.3455	1.1692	77.37	118.66	14.88	0.044401
2	0.2290	0.5650	0.7092	195.94	132.54	3.76	0.151231
3	0.3781	0.7286	0.7366	209.73	147.74	3.65	0.156889
4	0.5008	0.8077	0.9774	224.80	157.62	3.54	0.082215
5	0.6519	0.8590	0.8376	84.60	165.42	3.40	0.093024
6	0.7605	0.9003	0.8477	92.31	172.37	3.30	0.075190
7	0.8417	0.9347	0.9276	99.19	178.56	3.21	0.045240
8	0.9047	0.9583	0.8394	105.33	182.83	3.15	0.029210
9	0.9462	0.9750	0.7928	109.57	185.70	3.10	0.019304
10	0.9746	0.0000	0.0000	112.42	0.00	2.84	0.026159

REFLUX	ERROR	FEED	FEED CONC.
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112.42	0.1335	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.68	217.41	5537.24	98160.99
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0430	0.3512	1.1692	73.69	119.04	14.87	-0.001002
2	0.2333	0.5709	0.7092	192.72	133.08	3.75	-0.006971
3	0.3826	0.7324	0.7366	206.77	148.22	3.64	-0.009010
4	0.5031	0.8086	0.9774	221.92	157.80	3.54	-0.010353
5	0.6542	0.8599	0.8376	81.50	165.61	3.40	-0.012388
6	0.7624	0.9011	0.8477	89.33	172.55	3.29	-0.010398
7	0.8428	0.9351	0.9276	96.28	178.70	3.21	-0.008241
8	0.9054	0.9586	0.8394	102.44	182.95	3.15	-0.005062
9	0.9467	0.9752	0.7928	106.69	185.81	3.10	-0.001694
10	0.9751	0.0000	0.0000	109.56	0.00	2.84	0.003074

REFLUX	ERROR	FEED	FEED CONC.
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109.56	-0.4561	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.46	217.19	5537.24	98178.31
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TIME = 10.00

PLATE CONCV CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0412	0.3422	1.1692	17.37	118.66	14.98	0.044401
2	0.3222	0.2522	0.7092	197.94	172.74	1.76	0.121231
3	0.3781	0.7286	0.7366	209.73	147.74	1.62	0.126889
4	0.7222	0.8077	0.7716	224.68	167.62	3.24	0.172817
5	0.6219	0.8290	0.8376	84.60	162.42	3.40	0.093024
6	0.7707	0.9098	0.8477	92.81	172.37	3.30	0.071797
7	0.8417	0.9347	0.9276	92.19	178.26	3.21	0.042244
8	0.9047	0.9283	0.8394	102.33	182.81	3.12	0.027517
9	0.9462	0.9720	0.7028	109.87	182.70	3.11	0.019309
10	0.9744	0.9922	0.6000	112.42	0.00	2.84	0.026124

REFLUX ERROR FEED FEED CONC.

112.42 C.1332 120.00 0.2126

STEAM REBOILER TEMPERATURE COEFFICIENT HEAT LOAD

101.20 199.68 217.41 2237.24 1188.99

TIME = 12.00

PLATE CONCV CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0430	0.3212	1.1692	73.69	119.04	14.87	-0.001022
2	0.2918	0.2709	0.7092	122.72	133.08	3.72	-0.009271
3	0.3818	0.7324	0.7366	208.77	148.22	3.64	-0.009016
4	0.5031	0.8086	0.9774	221.92	127.80	4.24	-0.010323
5	0.6242	0.8299	0.8376	81.22	162.61	3.40	-0.012388
6	0.7624	0.9011	0.8477	92.73	172.22	3.29	-0.010316
7	0.8428	0.9321	0.9276	92.28	178.70	3.21	-0.012241
8	0.9024	0.9286	0.8394	102.44	182.92	3.11	-0.002062
9	0.9447	0.9722	0.7028	106.69	182.81	3.11	-0.016994
10	0.9721	0.9900	0.6000	109.24	0.00	2.84	-0.003074

REFLUX ERROR FEED FEED CONC.

102.26 -0.4261 120.00 0.2126

STEAM REBOILER TEMPERATURE COEFFICIENT HEAT LOAD

101.20 192.46 217.19 2237.24 817.31

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0424	0.3490	1.1692	73.14	118.91	14.87	-0.009407
2	0.2315	0.5686	0.7092	192.07	132.88	3.75	-0.024503
3	0.3806	0.7308	0.7366	206.05	148.01	3.64	-0.027144
4	0.5016	0.8080	0.9774	221.21	157.65	3.54	-0.019241
5	0.6525	0.8592	0.8376	80.86	165.43	3.40	-0.022449
6	0.7609	0.9005	0.8477	88.66	172.36	3.29	-0.019274
7	0.8417	0.9346	0.9276	95.62	178.52	3.21	-0.014173
8	0.9047	0.9583	0.8394	101.79	182.79	3.15	-0.009032
9	0.9464	0.9750	0.7928	106.07	185.68	3.10	-0.004918
10	0.9751	0.0000	0.0000	108.96	0.00	2.84	-0.003903

REFLUX ERROR FEED FEED CONC.

108.96 -0.3941 150.00 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.55	217.28	5537.24	98171.30
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0418	0.3469	1.1692	73.43	118.77	14.88	-0.005243
2	0.2299	0.5664	0.7092	192.22	132.68	3.76	-0.012616
3	0.3789	0.7295	0.7366	206.13	147.81	3.64	-0.013694
4	0.5004	0.8075	0.9774	221.28	157.53	3.54	-0.009162
5	0.6510	0.8587	0.8376	81.00	165.29	3.40	-0.011186
6	0.7596	0.9000	0.8477	88.77	172.22	3.30	-0.010107
7	0.8407	0.9343	0.9276	95.71	178.38	3.21	-0.007695
8	0.9041	0.9580	0.8394	101.88	182.67	3.15	-0.005187
9	0.9460	0.9749	0.7928	106.17	185.57	3.10	-0.003149
10	0.9749	0.0000	0.0000	109.08	0.00	2.84	-0.003398

REFLUX ERROR FEED FEED CONC.

109.08 -0.2217 150.00 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.64	217.37	5537.24	98164.04
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TABLE 0-13 CLOSED LOOP - STEP IN CONC. CONT. SET PNT. - 111

TIME = 50.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0488	0.3488	1.1888	73.18	118.81	14.88	-0.000000
2	0.2318	0.4888	0.1002	193.07	132.88	8.78	-0.024003
3	0.3888	0.1388	0.1388	206.03	148.01	8.68	-0.028144
4	0.5018	0.4888	0.9774	221.21	177.88	8.54	-0.019241
5	0.6288	0.8288	0.8378	80.88	162.88	8.48	-0.022444
6	0.7608	0.4888	0.8477	88.88	172.38	8.38	-0.019274
7	0.8477	0.4888	0.4878	92.62	178.22	8.21	-0.014178
8	0.9047	0.2288	0.4888	101.78	182.78	8.12	-0.009032
9	0.9444	0.9720	0.7878	108.07	182.88	8.10	-0.004918
10	0.9721	0.0000	0.0000	108.88	0.00	8.88	-0.008808

REFLUX ERROR FEED FEED CONC.

108.88 -0.3941 120.00 0.2128

STEAM TEMPERATURE
FLW REBOILER STEAM

101.20 199.22 217.38 2237.24 28171.30

COEFFICIENT
HEAT LOAD

TIME = 52.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0418	0.3488	1.1888	73.43	118.77	14.88	-0.002843
2	0.2288	0.4888	0.1002	192.22	132.88	8.78	-0.012618
3	0.3788	0.1388	0.1388	206.13	147.81	8.68	-0.013684
4	0.5004	0.8072	0.9774	221.28	127.93	8.54	-0.009188
5	0.6210	0.8287	0.8378	81.00	162.28	8.40	-0.011288
6	0.7288	0.9000	0.8477	88.77	172.27	8.38	-0.016107
7	0.8407	0.4888	0.9278	92.71	178.38	8.21	-0.007892
8	0.9041	0.2280	0.4888	101.88	182.67	8.12	-0.002187
9	0.9440	0.9748	0.7878	108.17	182.97	8.10	-0.003149
10	0.9749	0.0000	0.0000	109.88	0.00	8.88	-0.008808

REFLUX ERROR FEED FEED CONC.

102.08 -0.2217 120.00 0.2128

STEAM TEMPERATURE
FLW REBOILER STEAM

101.20 199.64 217.37 2237.24 28171.30

COEFFICIENT
HEAT LOAD

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 30.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0415	0.3458	1.1692	73.67	118.70	14.88	-0.001156
2	0.2292	0.5654	0.7092	192.37	132.59	3.76	-0.004799
3	0.3781	0.7288	0.7366	206.26	147.73	3.65	-0.005140
4	0.4999	0.8073	0.9774	221.41	157.49	3.54	-0.003240
5	0.6505	0.8585	0.8376	81.17	165.23	3.40	-0.003877
6	0.7591	0.8998	0.8477	88.92	172.16	3.30	-0.003646
7	0.8403	0.9341	0.9276	95.85	178.32	3.21	-0.002943
8	0.9038	0.9579	0.8394	102.02	182.61	3.15	-0.002152
9	0.9459	0.9748	0.7928	106.31	185.52	3.10	-0.001440
10	0.9748	0.0000	0.0000	109.22	0.00	2.84	-0.001750

REFLUX	ERROR	FEED	FEED CONC.
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109.22	-0.1094	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.68	217.40	5537.24	98161.49
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TIME = 35.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0415	0.3455	1.1692	73.76	118.68	14.88	-0.000225
2	0.2290	0.5651	0.7092	192.44	132.56	3.76	-0.001105
3	0.3778	0.7287	0.7366	206.32	147.71	3.65	-0.001253
4	0.4997	0.8072	0.9774	221.47	157.47	3.54	-0.000849
5	0.6503	0.8584	0.8376	81.24	165.22	3.40	-0.001234
6	0.7589	0.8997	0.8477	88.98	172.14	3.30	-0.001282
7	0.8402	0.9340	0.9276	95.90	178.30	3.21	-0.001125
8	0.9037	0.9579	0.8394	102.07	182.60	3.15	-0.000890
9	0.9458	0.9748	0.7928	106.36	185.50	3.10	-0.000631
10	0.9748	0.0000	0.0000	109.27	0.00	2.84	-0.000773

REFLUX	ERROR	FEED	FEED CONC.
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109.27	-0.0563	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.68	217.41	5537.24	98160.93
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TABLE 1 - CLOSED LOOP - STEP IN COND. CONT. SET PNT. - RUN 1

TIME = 30.00

PLATE COND. CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0415	0.3455	1.1695	73.67	118.70	14.88	-0.00115
2	0.2292	0.2621	0.7092	192.37	132.29	3.76	-0.00115
3	0.3781	0.7387	0.7386	206.26	147.73	1.44	-0.00234
4	0.4997	0.8073	0.9774	221.47	157.47	1.07	-0.00284
5	0.6202	0.8284	0.8376	81.17	162.23	1.47	-0.00115
6	0.7289	0.8997	0.8477	88.78	172.14	3.70	-0.00128
7	0.8402	0.9340	0.9276	70.00	178.30	3.21	-0.00115
8	0.9337	0.9279	0.8394	102.07	182.61	3.12	-0.000840
9	0.9458	0.9748	0.7928	106.31	182.20	3.10	-0.00140
10	0.9748	0.0000	0.0000	109.22	0.00	3.84	-0.00173

REFLUX ERROR FEED FEED COND.

109.22 -0.0074 120.00 0.2126

STEAM REBOILER TEMPERATURE COEFFICIENT HEAT LOAD

101.20 199.68 217.40 2237.24 28161.49

TIME = 35.00

PLATE COND. CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0415	0.3455	1.1695	73.74	118.68	14.88	-0.00028
2	0.2292	0.2621	0.7092	192.44	132.26	3.76	-0.00115
3	0.3778	0.7287	0.7386	206.12	147.71	2.62	-0.00123
4	0.4997	0.8073	0.9774	221.47	157.47	3.04	-0.00084
5	0.6202	0.8284	0.8376	81.24	162.23	3.40	-0.00124
6	0.7289	0.8997	0.8477	88.78	172.14	3.70	-0.00128
7	0.8402	0.9340	0.9276	70.00	178.30	3.21	-0.00115
8	0.9337	0.9279	0.8394	102.07	182.61	3.12	-0.000840
9	0.9458	0.9748	0.7928	106.31	182.20	3.10	-0.000831
10	0.9748	0.0000	0.0000	109.22	0.00	3.84	-0.00073

REFLUX ERROR FEED FEED COND.

109.22 -0.0263 120.00 0.2126

STEAM REBOILER TEMPERATURE COEFFICIENT HEAT LOAD

101.20 199.68 217.41 2237.24 28160.93

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0415	0.3455	1.1692	73.78	118.68	14.88	-0.000049
2	0.2289	0.5650	0.7092	192.46	132.56	3.76	-0.000281
3	0.3778	0.7286	0.7366	206.34	147.71	3.65	-0.000348
4	0.4997	0.8072	0.9774	221.49	157.47	3.54	-0.000278
5	0.6502	0.8584	0.8376	81.25	165.21	3.40	-0.000525
6	0.7588	0.8997	0.8477	88.99	172.13	3.30	-0.000601
7	0.8401	0.9340	0.9276	95.92	178.30	3.22	-0.000559
8	0.9036	0.9578	0.8394	102.08	182.59	3.15	-0.000456
9	0.9457	0.9747	0.7928	106.37	185.49	3.10	-0.000322
10	0.9747	0.0000	0.0000	109.28	0.00	2.84	-0.000368

REFLUX ERROR FEED FEED CONC.

109.28 -0.0322 150.00 0.5156

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

101.50 199.68 217.41 5537.24 98160.83

TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0415	0.3454	1.1692	73.79	118.68	14.88	-0.000043
2	0.2289	0.5650	0.7092	192.46	132.56	3.76	-0.000210
3	0.3778	0.7286	0.7366	206.34	147.70	3.65	-0.000249
4	0.4997	0.8072	0.9774	221.49	157.47	3.54	-0.000202
5	0.6502	0.8584	0.8376	81.26	165.21	3.40	-0.000355
6	0.7588	0.8997	0.8477	88.99	172.13	3.30	-0.000393
7	0.8401	0.9340	0.9276	95.91	178.29	3.22	-0.000359
8	0.9036	0.9578	0.8394	102.08	182.58	3.15	-0.000285
9	0.9457	0.9747	0.7928	106.37	185.49	3.10	-0.000195
10	0.9747	0.0000	0.0000	109.28	0.00	2.84	-0.000206

REFLUX ERROR FEED FEED CONC.

109.28 -0.0198 150.00 0.5156

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

101.50 199.68 217.41 5537.24 98160.78

TABLE 1 - CLOSING STEP IN COMB. UNIT. (PT. 1 - 10)

TIME = 40.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0412	0.3452	1.1692	18.16	118.68	14.11	-0.00004
2	0.2388	0.2520	0.1092	192.46	132.26	1.11	-0.00081
3	0.3718	0.1286	0.1166	206.34	147.70	1.66	-0.00046
4	0.4497	0.8072	0.9774	221.49	127.47	1.44	-0.00004
5	0.6202	0.8284	0.8376	81.26	162.21	1.40	-0.00046
6	0.1228	0.2297	0.8477	88.99	172.11	1.11	-0.00033
7	0.8401	0.9340	0.9276	92.91	178.29	1.11	-0.00033
8	0.9036	0.4978	0.8394	102.08	182.26	1.11	-0.00033
9	0.9427	0.9747	0.7928	106.37	182.47	1.11	-0.00033
10	0.9747	0.0000	0.0000	109.28	0.00	1.84	-0.00038

REFLUX ERROR FEED FEED CONC.

109.28 -0.0322 120.00 0.1126

STEAM TEMPERATURE
FLW RECHILER STEAM

101.20 102.64 217.41 237.24 28160.83

COEFFICIENT

HEAT LOAD

TIME = 42.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0412	0.3452	1.1692	18.16	118.68	14.11	-0.00004
2	0.2388	0.2520	0.1092	192.46	132.26	1.11	-0.00081
3	0.3718	0.1286	0.1166	206.34	147.70	1.66	-0.00046
4	0.4497	0.8072	0.9774	221.49	127.47	1.44	-0.00004
5	0.6202	0.8284	0.8376	81.26	162.21	1.40	-0.00046
6	0.1228	0.2297	0.8477	88.99	172.11	1.11	-0.00033
7	0.8401	0.9340	0.9276	92.91	178.29	1.11	-0.00033
8	0.9036	0.4978	0.8394	102.08	182.26	1.11	-0.00033
9	0.9427	0.9747	0.7928	106.37	182.47	1.11	-0.00033
10	0.9747	0.0000	0.0000	109.28	0.00	1.84	-0.00038

REFLUX ERROR FEED FEED CONC.

109.28 -0.0312 120.00 0.2126

STEAM TEMPERATURE
FLW RECHILER STEAM

101.20 102.64 217.41 237.24 28160.77

COEFFICIENT

HEAT LOAD

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0415	0.3454	1.1692	73.79	118.68	14.88	-0.000041
2	0.2289	0.5649	0.7092	192.46	132.55	3.76	-0.000185
3	0.3778	0.7286	0.7366	206.34	147.70	3.65	-0.000208
4	0.4997	0.8072	0.9774	221.49	157.47	3.54	-0.000163
5	0.6501	0.8584	0.8376	81.26	165.21	3.40	-0.000255
6	0.7588	0.8997	0.8477	88.99	172.12	3.30	-0.000269
7	0.8400	0.9340	0.9276	95.91	178.29	3.22	-0.000239
8	0.9036	0.9578	0.8394	102.08	182.58	3.15	-0.000185
9	0.9457	0.9747	0.7928	106.37	185.49	3.10	-0.000123
10	0.9747	0.0000	0.0000	109.28	0.00	2.84	-0.000127

REFLUX ERROR FEED FEED CONC.

109.28 -0.0123 150.00 0.5156

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.69	217.41	5537.24	98160.74
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0415	0.3454	1.1692	73.79	118.68	14.88	-0.000027
2	0.2289	0.5649	0.7092	192.46	132.55	3.76	-0.000123
3	0.3777	0.7286	0.7366	206.34	147.70	3.65	-0.000141
4	0.4997	0.8072	0.9774	221.49	157.47	3.54	-0.000103
5	0.6501	0.8584	0.8376	81.26	165.20	3.40	-0.000163
6	0.7588	0.8997	0.8477	88.99	172.12	3.30	-0.000172
7	0.8400	0.9340	0.9276	95.91	178.29	3.22	-0.000151
8	0.9036	0.9578	0.8394	102.08	182.58	3.15	-0.000115
9	0.9457	0.9747	0.7928	106.37	185.49	3.10	-0.000076
10	0.9747	0.0000	0.0000	109.28	0.00	2.84	-0.000079

REFLUX ERROR FEED FEED CONC.

109.28 -0.0076 150.00 0.5156

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.69	217.41	5537.24	98160.71
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TIME = 20.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR LD-UP DERIVATIVE

1	0.0412	0.3424	1.1695	13.79	118.68	14.88	-0.00007
2	0.2589	0.2649	0.7375	195.46	135.22	7.74	-0.00013
3	0.3777	0.7586	0.7366	506.34	147.70	3.67	-0.00041
4	0.4727	0.9714	0.9714	551.49	157.47	7.74	-0.00103
5	0.6521	0.8284	0.8376	81.26	149.34	1.77	-0.00063
6	0.7588	0.8997	0.8477	88.99	177.15	7.74	-0.00075
7	0.8400	0.9340	0.9376	95.91	178.29	3.55	-0.00051
8	0.9034	0.9278	0.8304	105.08	185.28	7.74	-0.00015
9	0.9427	0.9747	0.7058	106.37	187.43	7.74	-0.00036
10	0.9747	0.0000	0.0000	109.58	0.00	5.84	-0.00070

REFLUX ERROR FEED FEED CONC.

109.58 -0.0153 150.00 0.2156

STEAM TEMPERATURE COEFFICIENT HEAT LOAD

FLW REFLUX STEAM

101.20 109.69 517.41 5537.54 98160.74

TIME = 22.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR LD-UP DERIVATIVE

1	0.0412	0.3424	1.1695	13.79	118.68	14.88	-0.00007
2	0.2589	0.2649	0.7375	195.46	135.22	7.74	-0.00013
3	0.3777	0.7586	0.7366	506.34	147.70	3.67	-0.00041
4	0.4727	0.9714	0.9714	551.49	157.47	7.74	-0.00103
5	0.6521	0.8284	0.8376	81.26	149.34	1.77	-0.00063
6	0.7588	0.8997	0.8477	88.99	177.15	7.74	-0.00075
7	0.8400	0.9340	0.9376	95.91	178.29	3.55	-0.00051
8	0.9034	0.9278	0.8304	105.08	185.28	7.74	-0.00015
9	0.9427	0.9747	0.7058	106.37	187.43	7.74	-0.00036
10	0.9747	0.0000	0.0000	109.58	0.00	5.84	-0.00070

REFLUX ERROR FEED FEED CONC.

109.58 -0.0076 150.00 0.2156

STEAM TEMPERATURE COEFFICIENT HEAT LOAD

FLW REFLUX STEAM

101.20 109.69 517.41 5537.54 98160.74

TABLE U-13 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0415	0.3454	1.1692	73.79	118.67	14.88	-0.000016
2	0.2289	0.5649	0.7092	192.47	132.55	3.76	-0.000076
3	0.3777	0.7286	0.7366	206.34	147.70	3.65	-0.000086
4	0.4996	0.8072	0.9774	221.49	157.47	3.54	-0.000063
5	0.6501	0.8584	0.8376	81.26	165.20	3.40	-0.000099
6	0.7587	0.8997	0.8477	88.99	172.12	3.30	-0.000103
7	0.8400	0.9340	0.9276	95.91	178.29	3.22	-0.000090
8	0.9036	0.9578	0.8394	102.08	182.58	3.15	-0.000069
9	0.9457	0.9747	0.7928	106.37	185.49	3.10	-0.000045
10	0.9747	0.0000	0.0000	109.28	0.00	2.84	-0.000046

REFLUX	ERROR	FEED	FEED CONC.
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109.28	-0.0046	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.69	217.41	5537.24	98160.69
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0415	0.3454	1.1692	73.79	118.67	14.88	-0.000012
2	0.2289	0.5649	0.7092	192.47	132.55	3.76	-0.000053
3	0.3777	0.7286	0.7366	206.34	147.70	3.65	-0.000059
4	0.4996	0.8072	0.9774	221.49	157.47	3.54	-0.000044
5	0.6501	0.8584	0.8376	81.26	165.20	3.40	-0.000063
6	0.7587	0.8996	0.8477	88.99	172.12	3.30	-0.000066
7	0.8400	0.9340	0.9276	95.91	178.29	3.22	-0.000056
8	0.9036	0.9578	0.8394	102.08	182.58	3.15	-0.000042
9	0.9457	0.9747	0.7928	106.37	185.48	3.10	-0.000028
10	0.9747	0.0000	0.0000	109.28	0.00	2.84	-0.000026

REFLUX	ERROR	FEED	FEED CONC.
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109.28	-0.0028	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.69	217.41	5537.24	98160.68
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TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 0.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3342	1.1820	73.56	118.07	14.88	0.000003
2	0.2203	0.5495	0.7019	191.64	131.35	3.76	0.000006
3	0.3657	0.7329	0.8427	204.92	148.21	3.66	0.000004
4	0.5022	0.8080	0.9731	221.77	157.58	3.54	0.000001
5	0.6501	0.8562	0.7934	81.15	164.81	3.40	0.000003
6	0.7530	0.9002	0.9230	88.37	172.23	3.30	-0.000002
7	0.8400	0.9336	0.9107	95.79	178.19	3.22	0.000000
8	0.9019	0.9570	0.8329	101.75	182.40	3.15	-0.000001
9	0.9436	0.9757	0.9118	105.96	185.71	3.11	-0.000001
10	0.9757	0.0000	0.0000	109.28	0.00	2.84	-0.000000

REFLUX	ERROR	FEED	FEED CONC.
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109.28	-0.0028	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	200.27	219.25	5170.51	98160.63
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TIME = 5.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0684	0.4429	1.1820	94.56	124.38	14.82	0.327569
2	0.3041	0.6298	0.6005	218.24	138.64	3.70	0.744374
3	0.4362	0.7870	1.1210	231.92	155.30	3.60	0.549104
4	0.5556	0.8273	0.9199	248.11	161.27	3.49	0.337162
5	0.7006	0.8794	0.8869	103.76	169.69	3.35	0.378700
6	0.8006	0.9166	0.8686	111.82	176.20	3.26	0.377744
7	0.8710	0.9458	0.8968	117.93	181.51	3.18	0.244414
8	0.9223	0.9652	0.8019	122.98	184.92	3.13	0.155224
9	0.9553	0.9796	0.8195	126.24	187.29	3.09	0.087621
10	0.9785	0.0000	0.0000	128.50	0.00	2.83	0.071847

REFLUX	ERROR	FEED	FEED CONC.
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128.50	2.7424	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	195.79	214.79	5170.51	98254.58
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TIME = 0.00

PLATE CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0375	0.3345	1.1820	73.28	118.07	14.18	0.00000
2	0.2203	0.2203	0.7019	141.44	141.44	8.76	0.00000
3	0.3437	0.1329	0.8427	204.32	148.51	3.68	0.00000
4	0.2522	0.8083	0.9731	221.77	127.28	8.24	0.00001
5	0.8201	0.8201	0.7034	81.12	164.81	3.44	0.00003
6	0.7232	0.9002	0.9230	88.37	172.23	8.30	0.00005
7	0.8402	0.9338	0.9107	92.79	178.19	8.72	0.00000
8	0.9019	0.9719	0.8329	101.78	182.40	8.12	0.00001
9	0.9438	0.9727	0.9118	102.98	182.71	3.11	0.00001
10	0.9727	0.0000	0.0000	109.28	0.00	2.84	0.00000

REFLUX ERROR FEED FEED CONC.

109.28 -0.0028 100.00 0.2120

STEAM REFRIGILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

101.20 200.27 219.22 2110.21 98160.14

TIME = 2.00

PLATE CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0684	0.4429	1.1820	94.28	124.38	14.82	0.82729
2	0.3041	0.4429	0.6002	218.24	138.64	3.72	0.744374
3	0.4362	0.7870	1.1210	281.42	122.30	3.67	0.24104
4	0.2228	0.8273	0.9199	248.11	161.27	8.44	0.337182
5	0.7000	0.8774	0.8869	103.76	142.64	8.32	0.370700
6	0.8000	0.9118	0.9884	111.42	176.20	8.20	0.377744
7	0.8710	0.9428	0.8968	117.93	181.21	3.18	0.244414
8	0.9228	0.9622	0.8019	122.98	184.92	3.13	0.122284
9	0.9228	0.9719	0.9192	126.24	187.29	3.09	0.887621
10	0.9782	0.0000	0.0000	128.20	0.00	2.84	0.071847

REFLUX ERROR FEED FEED CONC.

128.20 2.7424 100.00 0.2120

STEAM REFRIGILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

101.20 192.79 214.79 2170.21 98290.2

TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0894	0.4941	1.1819	85.09	127.90	14.78	0.165874
2	0.3443	0.6629	0.5517	212.64	142.06	3.67	0.289949
3	0.4642	0.8019	1.2222	226.56	157.74	3.57	0.169176
4	0.5702	0.8318	0.9106	242.10	162.36	3.48	0.049819
5	0.7179	0.8863	0.9053	96.67	171.38	3.34	0.080693
6	0.8187	0.9232	0.8540	105.62	177.94	3.24	0.088087
7	0.8837	0.9509	0.8925	112.08	183.01	3.17	0.075692
8	0.9307	0.9687	0.7913	117.07	186.10	3.12	0.054297
9	0.9602	0.9813	0.7838	120.10	188.08	3.09	0.034507
10	0.9808	0.0000	0.0000	122.05	0.00	2.83	0.039117

REFLUX ERROR FEED FEED CONC.

122.05 0.3478 150.00 0.5156

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.92	211.93	5170.51	98314.78
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0968	0.5101	1.1819	79.23	129.13	14.76	0.028977
2	0.3551	0.6748	0.5505	208.30	143.22	3.66	0.017443
3	0.4712	0.8043	1.2222	222.38	157.99	3.57	-0.000751
4	0.5702	0.8318	0.9106	237.15	162.22	3.48	-0.028653
5	0.7183	0.8864	0.9053	91.41	171.26	3.34	-0.040325
6	0.8203	0.9238	0.8540	100.48	177.92	3.24	-0.025366
7	0.8857	0.9517	0.8925	107.17	183.03	3.17	-0.012409
8	0.9325	0.9694	0.7913	112.29	186.11	3.12	-0.002794
9	0.9616	0.9819	0.7838	115.38	188.05	3.09	0.002013
10	0.9818	0.0000	0.0000	117.31	0.00	2.83	0.009785

REFLUX ERROR FEED FEED CONC.

117.31 -0.7266 150.00 0.5156

STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	191.98	211.00	5170.51	98334.40
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TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0894	0.4941	1.1819	10.00	157.90	14.78	0.165874
2	0.3447	0.6039	0.7017	217.00	143.00	8.07	0.165874
3	0.4442	0.7019	1.5555	527.00	157.74	7.07	0.165874
4	0.5705	0.8318	0.9106	845.10	105.30	3.48	0.049819
5	0.7179	0.9593	0.9053	96.67	171.38	2.34	0.000000
6	0.8187	0.9733	0.8944	100.48	177.04	2.34	0.088087
7	0.8837	0.9509	0.8957	117.08	183.01	2.17	0.070000
8	0.9307	0.9007	0.7013	117.07	186.10	2.15	0.004297
9	0.9605	0.8813	0.7038	127.10	188.08	2.09	0.004000
10	0.9808	0.8000	0.0000	155.05	0.00	2.03	0.000000

REFLUX ERROR FEED FEED CONC.

155.05 0.3478 150.00 0.2150

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

101.50 195.95 211.93 210.51 9814.70

TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0894	0.5101	1.1819	10.00	159.13	14.78	0.165874
2	0.3551	0.6745	0.5505	208.30	143.55	8.06	0.017447
3	0.4715	0.8043	1.5555	525.38	157.99	7.27	0.000000
4	0.5705	0.8318	0.9106	837.15	104.78	3.48	0.088087
5	0.7183	0.8864	0.9053	91.41	171.50	2.34	0.000000
6	0.8187	0.9733	0.8944	100.48	177.04	2.34	0.000000
7	0.8837	0.9517	0.8957	107.17	183.01	2.17	0.010000
8	0.9307	0.9000	0.7013	115.00	186.11	2.15	0.000000
9	0.9610	0.8810	0.7038	115.38	188.08	2.09	0.000000
10	0.9810	0.8000	0.0000	117.31	0.00	2.03	0.000000

REFLUX ERROR FEED FEED CONC.

117.31 -0.7566 150.00 0.2150

STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD

101.50 191.91 211.00 210.51 9834.70

TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0967	0.5094	1.1819	77.60	129.09	14.76	-0.019006
2	0.3530	0.6734	0.5505	206.72	143.08	3.67	-0.044313
3	0.4685	0.8032	1.2222	220.75	157.76	3.57	-0.044813
4	0.5676	0.8309	0.9106	235.47	161.97	3.48	-0.027776
5	0.7145	0.8850	0.9053	89.71	170.88	3.34	-0.041915
6	0.8173	0.9225	0.8540	98.66	177.54	3.24	-0.036485
7	0.8837	0.9508	0.8925	105.36	182.73	3.17	-0.027076
8	0.9314	0.9690	0.7913	110.57	185.89	3.12	-0.016236
9	0.9612	0.9817	0.7838	113.75	187.89	3.09	-0.008247
10	0.9818	0.0000	0.0000	115.76	0.00	2.83	-0.005534

REFLUX	ERROR	FEED	FEED CONC.
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115.76	-0.7559	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.00	211.02	5170.51	98334.11
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0949	0.5059	1.1819	77.90	128.82	14.76	-0.018036
2	0.3497	0.6703	0.5505	206.75	142.75	3.67	-0.030458
3	0.4654	0.8020	1.2222	220.71	157.54	3.57	-0.026947
4	0.5660	0.8304	0.9106	235.52	161.83	3.48	-0.011214
5	0.7120	0.8841	0.9053	89.82	170.65	3.34	-0.017972
6	0.8150	0.9216	0.8540	98.66	177.30	3.24	-0.018401
7	0.8819	0.9501	0.8925	105.33	182.51	3.17	-0.014970
8	0.9303	0.9684	0.7913	110.55	185.71	3.12	-0.010462
9	0.9605	0.9814	0.7838	113.77	187.76	3.09	-0.006455
10	0.9815	0.0000	0.0000	115.82	0.00	2.83	-0.006733

REFLUX	ERROR	FEED	FEED CONC.
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115.82	-0.4544	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.21	211.23	5170.51	98329.59
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TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT. - RUN 5

TIME = 50.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE							
1	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
2	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
3	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
4	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
5	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
6	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
7	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
8	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
9	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
10	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
REFLUX				FEED	ERROR	FEED CONC.	
115.76				150.00	-0.7529	0.2150	
STEAM				TEMPERATURE	COEFFICIENT	HEAT LOAD	
101.20				211.05	2170.21	98334.11	

TIME = 55.00

PLATE CONCX CONCX EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE							
1	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
2	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
3	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
4	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
5	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
6	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
7	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
8	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
9	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
10	0.0000	0.0000	0.0000	1.1819	17.60	129.09	14.78 -0.0141
REFLUX				FEED	ERROR	FEED CONC.	
115.85				150.00	-0.4244	0.2150	
STEAM				TEMPERATURE	COEFFICIENT	HEAT LOAD	
101.20				211.23	2170.21	9835.11	

TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 30.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0939	0.5035	1.1819	78.33	128.64	14.77	-0.008159
2	0.3478	0.6684	0.5505	206.99	142.56	3.67	-0.014566
3	0.4639	0.8015	1.2222	220.92	157.45	3.57	-0.011627
4	0.5654	0.8302	0.9106	235.82	161.79	3.48	-0.003133
5	0.7111	0.8838	0.9053	90.17	170.59	3.34	-0.004632
6	0.8140	0.9213	0.8540	98.97	177.22	3.24	-0.005647
7	0.8811	0.9498	0.8925	105.60	182.43	3.17	-0.005335
8	0.9297	0.9682	0.7913	110.82	185.64	3.12	-0.004315
9	0.9601	0.9812	0.7838	114.04	187.71	3.09	-0.003052
10	0.9813	0.0000	0.0000	116.10	0.00	2.83	-0.003747

REFLUX	ERROR	FEED	FEED CONC.
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116.10	-0.2221	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.35	211.36	5170.51	98326.77
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0934	0.5024	1.1819	78.51	128.56	14.77	-0.003597
2	0.3471	0.6676	0.5505	207.09	142.48	3.67	-0.006093
3	0.4632	0.8012	1.2222	221.01	157.42	3.57	-0.004717
4	0.5653	0.8301	0.9106	235.95	161.79	3.48	-0.001094
5	0.7109	0.8838	0.9053	90.32	170.58	3.34	-0.001152
6	0.8138	0.9212	0.8540	99.11	177.20	3.24	-0.001542
7	0.8808	0.9497	0.8925	105.73	182.41	3.17	-0.001676
8	0.9295	0.9681	0.7913	110.94	185.62	3.12	-0.001547
9	0.9600	0.9812	0.7838	114.16	187.69	3.09	-0.001210
10	0.9812	0.0000	0.0000	116.23	0.00	2.83	-0.001576

REFLUX	ERROR	FEED	FEED CONC.
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116.23	-0.1099	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.40	211.42	5170.51	98325.56
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TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET POINT - RUN 5

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	110.10	0.00	14.77	-0.000154
2	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
3	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
4	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
5	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
6	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
7	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
8	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
9	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
10	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
REFLUX	116.10	-0.2221	150.00	0.2126			
FEED							
FEED CONC.							
STEAM							
REBOILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	110.10	0.00	14.77	-0.000154
2	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
3	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
4	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
5	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
6	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
7	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
8	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
9	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
10	0.0000	0.0000	0.0000	102.00	182.48	3.67	-0.014504
REFLUX	116.23	-0.1099	150.00	0.2126			
FEED							
FEED CONC.							
STEAM							
REBOILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							

TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 40.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0932	0.5018	1.1819	78.55	128.53	14.77	-0.002254
2	0.3467	0.6672	0.5505	207.08	142.44	3.67	-0.003978
3	0.4629	0.8011	1.2222	220.99	157.41	3.57	-0.003216
4	0.5652	0.8301	0.9106	235.96	161.78	3.48	-0.001043
5	0.7109	0.8838	0.9053	90.34	170.57	3.34	-0.001007
6	0.8137	0.9212	0.8540	99.13	177.19	3.24	-0.000971
7	0.8807	0.9496	0.8925	105.75	182.40	3.17	-0.000900
8	0.9294	0.9681	0.7913	110.96	185.61	3.12	-0.000766
9	0.9599	0.9811	0.7838	114.18	187.68	3.09	-0.000570
10	0.9811	0.0000	0.0000	116.25	0.00	2.83	-0.000679

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

116.25	-0.0633	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.43	211.45	5170.51	98324.96
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TIME = 45.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0930	0.5014	1.1819	78.54	128.50	14.77	-0.001896
2	0.3463	0.6668	0.5505	207.04	142.41	3.67	-0.003502
3	0.4627	0.8010	1.2222	220.95	157.39	3.57	-0.002913
4	0.5651	0.8301	0.9106	235.94	161.77	3.48	-0.001064
5	0.7108	0.8837	0.9053	90.33	170.56	3.34	-0.001102
6	0.8136	0.9211	0.8540	99.12	177.18	3.24	-0.000951
7	0.8807	0.9496	0.8925	105.74	182.39	3.17	-0.000761
8	0.9293	0.9680	0.7913	110.95	185.61	3.12	-0.000562
9	0.9599	0.9811	0.7838	114.16	187.68	3.09	-0.000373
10	0.9811	0.0000	0.0000	116.23	0.00	2.83	-0.000394

REFLUX	ERROR	FEED	FEED CONC.
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116.23	-0.0406	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.46	211.47	5170.51	98324.50
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TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0929	0.5011	1.1819	78.54	128.47	14.77	-0.001584
2	0.3461	0.6666	0.5505	207.02	142.38	3.67	-0.002938
3	0.4624	0.8009	1.2222	220.93	157.38	3.57	-0.002440
4	0.5650	0.8301	0.9106	235.93	161.77	3.48	-0.000864
5	0.7107	0.8837	0.9053	90.32	170.56	3.34	-0.000894
6	0.8135	0.9211	0.8540	99.11	177.17	3.24	-0.000764
7	0.8806	0.9496	0.8925	105.73	182.38	3.17	-0.000591
8	0.9293	0.9680	0.7913	110.94	185.60	3.12	-0.000417
9	0.9598	0.9811	0.7838	114.16	187.67	3.09	-0.000267
10	0.9811	0.0000	0.0000	116.23	0.00	2.83	-0.000274

REFLUX	ERROR	FEED	FEED CONC.
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116.23	-0.0258	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.47	211.49	5170.51	98324.12
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0928	0.5008	1.1819	78.55	128.45	14.77	-0.001212
2	0.3459	0.6663	0.5505	207.00	142.36	3.67	-0.002217
3	0.4623	0.8009	1.2222	220.91	157.37	3.57	-0.001820
4	0.5650	0.8300	0.9106	235.92	161.76	3.48	-0.000599
5	0.7106	0.8837	0.9053	90.32	170.55	3.34	-0.000591
6	0.8135	0.9211	0.8540	99.11	177.17	3.24	-0.000500
7	0.8806	0.9496	0.8925	105.73	182.38	3.17	-0.000385
8	0.9293	0.9680	0.7913	110.94	185.60	3.12	-0.000272
9	0.9598	0.9811	0.7838	114.16	187.67	3.09	-0.000174
10	0.9811	0.0000	0.0000	116.23	0.00	2.83	-0.000184

REFLUX	ERROR	FEED	FEED CONC.
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116.23	-0.0155	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.49	211.50	5170.51	98323.81
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TABLE 1 - CLOSED LOOP - STEP IN 100% CONT. SET POINT - RUN

TIME = 20.00

PLATE	CONCX	CONCX EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1819	78.24	128.47	14.77 -0.00000000
2	0.0000	0.0000	0.0000	207.02	142.38	3.87 -0.00000000
3	0.0000	0.0000	1.2522	227.03	127.38	3.27 -0.00000000
4	0.0000	0.0000	0.0000	227.03	161.77	3.48 -0.00000000
5	0.0000	0.0000	0.0000	207.02	170.20	3.34 -0.00000000
6	0.0000	0.0000	0.0000	207.02	177.17	3.24 -0.00000000
7	0.0000	0.0000	0.0000	102.73	182.38	3.17 -0.00000000
8	0.0000	0.0000	0.0000	110.94	182.60	3.12 -0.00000000
9	0.0000	0.0000	0.0000	114.16	187.67	3.09 -0.00000000
10	0.0000	0.0000	0.0000	116.23	0.00	2.88 -0.00000000
REFLUX	116.23	-0.0028	120.00	FEED	0.0000	FEED CONC.
STEAM FLOW	101.20	122.47	211.49	TEMPERATURE	COEFFICIENT	HEAT LOAD
					2170.21	98324.12

TIME = 22.00

PLATE	CONCX	CONCX EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	1.1819	78.24	128.47	14.77 -0.00000000
2	0.0000	0.0000	0.0000	207.02	142.38	3.87 -0.00000000
3	0.0000	0.0000	1.2522	227.03	127.38	3.27 -0.00000000
4	0.0000	0.0000	0.0000	227.03	161.77	3.48 -0.00000000
5	0.0000	0.0000	0.0000	207.02	170.20	3.34 -0.00000000
6	0.0000	0.0000	0.0000	207.02	177.17	3.24 -0.00000000
7	0.0000	0.0000	0.0000	102.73	182.38	3.17 -0.00000000
8	0.0000	0.0000	0.0000	110.94	182.60	3.12 -0.00000000
9	0.0000	0.0000	0.0000	114.16	187.67	3.09 -0.00000000
10	0.0000	0.0000	0.0000	116.23	0.00	2.88 -0.00000000
REFLUX	116.23	-0.0028	120.00	FEED	0.0000	FEED CONC.
STEAM FLOW	101.20	122.47	211.49	TEMPERATURE	COEFFICIENT	HEAT LOAD
					2170.21	98324.12

TABLE U-14 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0927	0.5006	1.1819	78.56	128.44	14.77	-0.000876
2	0.3457	0.6662	0.5505	207.00	142.34	3.67	-0.001579
3	0.4621	0.8008	1.2222	220.90	157.36	3.57	-0.001283
4	0.5649	0.8300	0.9106	235.92	161.76	3.48	-0.000401
5	0.7106	0.8837	0.9053	90.32	170.55	3.34	-0.000362
6	0.8134	0.9211	0.8540	99.11	177.17	3.24	-0.000297
7	0.8805	0.9495	0.8925	105.73	182.38	3.17	-0.000227
8	0.9292	0.9680	0.7913	110.94	185.60	3.12	-0.000160
9	0.9598	0.9811	0.7838	114.16	187.67	3.09	-0.000103
10	0.9811	0.0000	0.0000	116.23	0.00	2.83	-0.000111

REFLUX	ERROR	FEED	FEED CONC.
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116.23	-0.0088	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.50	211.52	5170.51	98323.58
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0926	0.5004	1.1819	78.56	128.43	14.77	-0.000615
2	0.3456	0.6661	0.5505	206.99	142.33	3.67	-0.001098
3	0.4620	0.8008	1.2222	220.89	157.36	3.57	-0.000885
4	0.5649	0.8300	0.9106	235.92	161.76	3.48	-0.000263
5	0.7106	0.8836	0.9053	90.32	170.55	3.34	-0.000219
6	0.8134	0.9211	0.8540	99.11	177.16	3.24	-0.000169
7	0.8805	0.9495	0.8925	105.73	182.37	3.17	-0.000126
8	0.9292	0.9680	0.7913	110.94	185.59	3.12	-0.000087
9	0.9598	0.9811	0.7838	114.16	187.67	3.09	-0.000057
10	0.9811	0.0000	0.0000	116.24	0.00	2.83	-0.000061

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

116.24	-0.0048	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.51	211.52	5170.51	98323.42
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D. Closed Loop Experiments - "Foxboro Equation"

Subroutine "Main" - Inclusion of this Fortran subroutine shows the changes made in the Unsteady Program when the overhead composition controller was included.

<u>Table</u>	<u>Title</u>
U-15	Closed Loop - Step in the Feed Flow - Run 1
U-16	Closed Loop - Step in the Feed Flow - Run 2
U-17	Closed Loop - Step in the Steam Flow - Run 1
U-18	Closed Loop - Step in the Steam Flow - Run 2
U-19	Closed Loop - Step in the Comp. Cont. Set Pnt. - Run 1
U-20	Closed Loop - Step in the Comp. Cont. Set Pnt. - Run 2


```

IBFTC COLUMN  NODECK
C**
C**  FOXBORO EQUATION
C**
      OCOMMON XEF(30),YEF(30),XHL(20),HLF(20),XDL(20),ROLT(20
      1),XT(10),
      1YT(10),LT(10),VT(10),HLT(10),HVT(10),WT(10),W(10),HL(1
      10),F(10),QR,
      2X(10),EMX(10,2),EMY(10,2),TLX(10),TLY(10),UAX(10),UAY(
      110),YE(10),
      3EM(10),TR,S(5),TS,UA,SF,AU,BU,RAT,AHLO,BHLO,HSI,HF,XF,
      1DXT(10)
      4,DI,VR,VP(10),VC,QLY(10,2),ERX2,DXHD(20),DHLF(20),DROL
      1(20)
      5,ITIT(10)
      COMMON DT,NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPL,NPR,KE,
      1NPDH
      REAL XTT(10),KP,KINT,LRFL,HV(10),LT,LX10
      REAL AX(500),AY(500,6),XP(500),DX(10),TD(50),XTD(50,10
      1)
      REWIND 3
      1 FORMAT (1X,12I5)
      2 FORMAT (1X,F11.6,5F12.6)
      29 FORMAT (1X,I5,4F15.8,F10.4)
      75 FORMAT (1X,I4,5F13.6)
      READ(5,1) NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPR,NPDH
      WRITE(6,1)NT,NTT,NPX,NPH,NPD,ND,LF,NPI,NPE,NPR,NPDH
      RAT=32.04/18.016
C**  EQUILIBRIUM DATA
      DO 4 J=1,NPX
      4 READ (5,5) XEF(J),YEF(J)
C**  LIQUID ENTHALPY DATA
      DO 6 J=1,NPH
      6 READ(5,5) XHL(J),HLF(J)
      5 FORMAT (6X,2F15.8)
C**  LIQUID DENSITY DATA
      DO 8 J=1,NPD
      8 READ (5,7) XDL(J),ROLT(J)
      7 FORMAT (1X,5F10.6)
C**  DERIVATIVES OF HL AND W
      DO 12 J=1,NPDH
      12 READ (5,2) DXHD(J),DHLF(J),DROL(J)
C**  TEMPERATURE OF THE LIQUID IN REBOILER
      READ(5,2) (TLX(N),N=1,NPR)
      WRITE(6,2)(TLX(N),N=1,NPR)
      READ(5,2) (TLY(N),N=1,NPR)
      WRITE(6,2)(TLY(N),N=1,NPR)
C**  CONSTANTS FOR REFLUX FLOW RATE
      BRD=ALOG(200./71.)/ALOG(72./10.)
      ARD=200./(72.**BRD)
C**  DATA FOR TRANSIENT RUN
      DO 35 NR=1,ND
      WRITE(6,37)
      WRITE(4,37)
      37 FORMAT (1H1)

```

IBFTC COLUMN NODECK

C**
C**
C**

FOXBORO EQUATION

COMMON XEF(30),YEF(30),XHL(50),HLE(50),XOL(50),ROL(10),
1,XI(10),
YT(10),LI(10),VT(10),HLT(10),HAT(10),WT(10),W(10),HLE
10,LI(10),
SX(10),EMX(10,S),EMY(1,S),TLX(10),TLY(10),UAX(10),
10,YE(10),
3EM(10),TR(2),TS,UA,SE,UA,BG,RAJ,AHL,BHL,H2I,M,X,
1CXT(10)
4,DI,VX,VPI(10),VC,QLY(10,S),ERXS,UXHD(50),
1(50)
5,ITIT(10)
COMMON DT,NT,NTT,NPX,NPH,NPD,NL,LI,NPI,NPE,NPL,NPR,NP
INPDH
REAL XTT(10),KP,KIT,LRF,LHV(10),LI,LXI
REAL AX(50),AY(50),XP(50),DX(10),ID(50),XTB(50),

C**

REWIND 3
1 FORMAT (1X,12I5)
2 FORMAT (1X,F11.6,2F15.6)
25 FORMAT (1X,12,4F15.8,4F10.4)
25 FORMAT (1X,14,2F13.6)

READ(5,1) NT,NTT,NPX,NPH,NPD,NL,LI,NPI,NPE,NPL,NPR,NP
WRITE(6,1)NT,NTT,NPX,NPH,NPD,NL,LI,NPI,NPE,NPL,NP
RAT=32.04/18.016
EQUILIBRIUM DATA

C**

DO 4 J=1,NPX
4 READ (5,2) XEF(J),YEF(J)
LIQUID ENTHALPY DATA

C**

DO 6 J=1,NP
6 READ(5,2) XHL(J),HLE(J)
2 FORMAT (6X,2F15.8)
LIQUID DENSITY DATA

C**

DO 8 J=1,NPD
8 READ (5,7) XOL(J),ROL(J)
7 FORMAT (1X,2F10.6)
DERIVATIVES OF HL AND W

C**

DO 12 J=1,NPDH
12 READ (5,2) DXHD(J),DHLF(J),DROL(J)
TEMPERATURE OF THE LIQUID IN REBOILER

C**

READ(5,2) (TLX(N),N=1,NPR)
WRITE(6,2)(TLX(N),N=1,NPR)
READ(5,2) (TLY(N),N=1,NPR)
WRITE(6,2)(TLY(N),N=1,NPR)
CONSTANTS FOR REFLUX FLOW RATE
BRD=ALOG(200.271)/ALOG(72.210)
ARI=200.271**BRD

C**

DATA FOR TRANSIENT RUN
DO 35 NR=1,ND
WRITE(6,37)
WRITE(6,37)
37 FORMAT (1H)


```

DTOUT=0.0
DI=0.0
DK=0.0
ERX1=0.0
SUMER=0.0
KE=1
KIT=0
KST=0
READ(5,36) (ITIT(J),J=1,10)
36 FORMAT (1X,10A6)
READ(5,1) LF
READ(5,2) TFIN,STEP,TOUT,KP,KINT,DTD
WRITE(6,2) TFIN,STEP,TOUT,KP,KINT,DTD
READ(5,24) VR,(VP(N),N=2,NTT),VC
WRITE(6,24) VR,(VP(N),N=2,NTT),VC
24 FORMAT (1H,10F7.4)
READ(5,26) SLCC,DT,STEPXD
DT=DT/60.
WRITE(6,26) SLCC,ARD,BRD,DT,STEPXD
SLCC=100./SLCC
WRITE(6,26) SLCC
READ(5,26) UA,AHLO,BHLO,HSI
WRITE(6,26) UA,AHLO,BHLO,HSI
26 FORMAT (6X,4F15.8)
READ(5,14) F(1),STEPF,SF,STEPS,PCS,STEPR,XF,STEPXF,SPG
WRITE(6,14) F(1),STEPF,SF,STEPS,PCS,STEPR,XF,STEPXF,SPG
14 FORMAT (1X,6F9.4,3F7.4)
GAIN=100./KP
AV=1.0+0.0008*DTD/KINT
BV=0.2*DTD/(DT*60.)
CV=0.004/KINT
DV=1.0+DTD/KINT
CVV=CV*DT*30.
EV=BV+AV+CVV
FV=CVV-BV
SUMV1=0.0
SUME1=0.0
PC1=PCS
WRITE(6,857) KIT,AV,BV,CV,DV,EV,FV
C** INITIAL AND FINAL EFFICIENCIES AND HEAT LOSSES
DO 10 N=1,NTT
READ(5,11) EMX(N,1),EMY(N,1),QLY(N,1),EMX(N,2),EMY(N,2),
1),QLY(N,2)
10 WRITE(6,11) EMX(N,1),EMY(N,1),QLY(N,1),EMX(N,2),EMY(N,2),
1),QLY(N,2)
11 FORMAT (1X,2(F11.8,F12.8,F16.8))
C** EXPERIMENTAL TRANSIENT DATA
READ(5,1) NEXP
DO 15 J=1,NEXP
15 READ(5,16) TD(J),(XTD(J,N),N=1,NPI)
16 FORMAT (1X,11F7.4)
C** INITIAL VALUES OF THE LIQUID COMPOSITIONS
READ (5,2) (XT(J),J=1,NPI)
WRITE(6,2) (XT(J),J=1,NPI)
WRITE(6,76)

```



```

WRITE(6,76)
READ(5,2) (XT(J),J=1,NP1)
READ(5,2) (XT(J),J=1,NP1)
INITIAL VALUES OF THE LIQUID COMPOSITIONS
16 FORMAT (1X,1F7.4)
15 READ(5,16) TD(J), (XTD(J),N=1,NP1)
DO 15 J=1,NEXP
READ(5,1) NEXP
** EXPERIMENTAL TRANSIENT DATA
11 FORMAT (1X,2F11.8,F12.6,F16.8)
1, QLY(N,2)
10 WRITE(6,11) EMX(N,1), EMY(N,1), QLY(N,1), EMX(N,2), EMY(N,2)
DO 10 N=1,NTT
** INITIAL AND FINAL EFFICIENCIES AND HEAT LOSSES
WRITE(6,85) KIT,AV,BV,CV,DV,EV,FV
PCI=PC2
SUMFI=0.0
SUMVI=0.0
FV=CVV-HV
EV=BV+AV+CVV
CVV=CV*DT*30.
DV=1.0+DTDKINT
CV=0.004VKINT
BV=0.5*DTDV(DT*60.)
AV=1.0+0.008*DTDKINT
GAIN=100. VKP
14 FORMAT (1X,6F9.4,3F7.4)
WRITE(6,14) F(1), STEPF, 2F, STEPS, FCS, STEPR, XF, STEPX1, 2F
READ(5,14) F(1), STEPF, 2F, STEPS, FCS, STEPR, XF, STEPX1, 2F
26 FORMAT (6X,4F12.8)
WRITE(6,26) UA,AHLU,BHLU,H2I
READ(5,26) UA,AHLU,BHLU,H2I
WRITE(6,26) SLCC
SLCC=100. \SLCC
WRITE(6,26) SLCC,ARD,BRD,DT,STEPX
ET=DT\60.
READ(5,26) SLCC,DT,STEPXD
24 FORMAT (1H,10F7.4)
WRITE(6,24) VR,(VP(N),N=2,NTT),VC
READ(5,24) VR,(VP(N),N=2,NTT),VC
WRITE(6,24) TFIN,STEP,TOUT,KP,KINT,DII
READ(5,24) TFIN,STEP,TOUT,KP,KINT,DII
36 FORMAT (1X,10A6)
36 READ(5,36) (TTIT(J),J=1,10)
K2T=0
KIT=0
KF=1
SUMER=0.0
EXI=0.0
DK=0.0
DI=0.0
ETOUT=0.0

```

```

76 FORMAT (1HK,16H INITIAL VALUES)
C** ENTHALPY OF THE FEED
DO 80 J=9,NPH
  IF (XHL(J)-XF) 80,81,82
80 CONTINUE
81 HF=HLF(J)
  GO TO 34
82 SLOPE=(HLF(J)-HLF(J-1))/(XHL(J)-XHL(J-1))
  HF=SLOPE*(XF-XHL(J-1))+HLF(J-1)
34 LT(NPI)=LRFL
  XD=XT(NPI)
C** INITIAL VALUES
  CALL PROPER
  DO 19 N=1,NPI
    X(N)=XT(N)
    HL(N)=HLT(N)
19 W(N)=WT(N)
  CALL EFFICI
  LT(NPI)=SQRT(SPG)*ARD*(PCS**BRD)
  CALL FLOWS
  CALL DERIV
  DO 20 N=1,NPI
20 DX(N)=DXT(N)
  DO 32 K=1,NPI
    WRITE(6,75) K,HVT(K),HL(K),W(K),HF
    WRITE(6,75) K,X(K),YE(K),EM(K),DX(K)
32 WRITE(6,75) K,XT(K),YT(K),LT(K),VT(K)
C** EXPERIMENTAL DATA ON TAPE
  DO 17 J=1,NEXP
17 WRITE(3,400) TD(J),(XTD(J,N),N=1,NTT)
  WRITE(3,401)
C** CALCULATION OF DERIVATIVE AT I+1
  I=1
  WRITE(6,551)
551 FORMAT (1H1)
  GO TO 100
48 DO 45 N=1,NPI
  X(N)=XT(N)
  XT(N)=XT(N)+DT*DX(N)
45 XTT(N)=XT(N)
  CALL PROPER
  CALL EFFICI
C** OVERHEAD COMPOSITION CONTROLLER
  ERX2=SLCC*(XD-XT(NPI))
  SUME=SUME1+(ERX2+ERX1)*DT*30.
  PROP=GAIN*DV*ERX2
  PINT=GAIN*SUME/KINT
  DER=-GAIN*DTD*SLCC*DXT(NPI)/60.
  PC=(PROP+PINT+DER-PC1*FV-CV*SUMV1+2.*CVV*PCS+AV*PCS)/E
1V
844 LT(NPI)=SQRT(SPG)*ARD*(PC**BRD)
  CALL FLOWS
  CALL DERIV
46 DO 53 N=1,NPI
  DXAVE=(DX(N)+DXT(N))/2.

```



```

C**  NEW X IS CALCULATED
53  XT(N)=X(N)+DT*DXAVE
C**  CHECK ON CONVERGENCE
721 KIT=KIT+1
    DO 55 N=1,NPI
        ERRX=ABS((XT(N)-XTT(N))/XTT(N))
        IF (ERRX.GT.0.0001) GO TO 56
55  CONTINUE
    GO TO 66

C**  NEW GUESS OF THE COMPOSITION ON THE TRAYS
C**  RESET OF X
C**  CONTROLS NO. OF ITERATIONS
56  IF (KIT.LE.25) GO TO 88
    IF (KIT.LE.30) GO TO 39
    WRITE(6,40)
40  FORMAT (1X,51H KIT EXCEEDED ITERATION LIMIT
1      )
    WRITE(6,771) (XT(N),N=1,NPI)
771  FORMAT (1X,3HXT=,10F12.8)
    WRITE(6,772) (XTT(N),N=1,NPI)
772  FORMAT (1X,4HXTT=,10F12.8)
    GO TO 66
39  DO 90 N=1,NPI
90  XT(N)=(XT(N)+XTT(N))/2.
88  DO 57 N=1,NPI
57  XTT(N)=XT(N)

C**  THERMODYNAMIC PROPERTIES AT I+1
    CALL PROPER
C**  REFLUX FLOW RATE
C**  OVERHEAD COMPOSITION CONTROLLER
    ERX2=SLCC*(XD-XT(NPI))
    SUME=SUME1+(ERX2+ERX1)*DT*30.
    PROP=GAIN*DV*ERX2
    PINT=GAIN*SUME/KINT
    DER=-GAIN*DTD*SLCC*DXT(NPI)/60.
    PC=(PROP+PINT+DER-PC1*FV-CV*SUMV1+2.*CVV*PCS+AV*PCS)/E
1V
842 LT(NPI)=SQRT(SPG)*ARD*(PC**BRD)
857 FORMAT (1X,I3,10F12.7)

C**  EFFICIENCIES
    CALL EFFICI
C**  CALCULATION OF LIQUID AND VAPOR FLOWS
    CALL FLOWS
C**  DERIVATIVES
    CALL DERIV
    GO TO 46

C**  OUTPUT
66  DI=DI+DT*60.
C**  INITIAL VALUES RESET
    DO 72 N=1,NTT
        DX(N)=DXT(N)
        W(N)=WT(N)
72  HL(N)=HLT(N)
    SUMV1=SUMV1+(PC+PC1-2.*PCS)*DT*30.
    PC1=PC

```

```

      PCL=PC
      SUMV1=SUMV1+(PC+PCL-2.*PC2)*DT*30.
      HL(N)=HL(N)
      W(1)=WT(N)
      DX(N)=DXT(N)
      DO 75 N=1,NIT
      ** INITIAL VALUES RESET
      66 DI=D1+DT*60.
      ** OUTPUT
      GO TO 46
      CALL DERIV
      ** DERIVATIVES
      CALL FLOW2
      ** CALCULATION OF LIQUID AND VAPOR FLOWS
      CALL EFFICI
      ** EFFICIENCIES
      857 FORMAT (1X,18,10F12.7)
      LT(NP1)=SQRT(2*PC)*ARD*(PC**BRD)
      IV
      PC=(PROP+PINT+DER-PCL*FV-G*SUMV1+2.*G*VA*PC2+VA*P)
      DER=-GAIN*DTD*SLCC*DXT(NP1)*60.
      PINT=GAIN*SUME\KINT
      PROP=GAIN*DV*ERX2
      SUME=SUME1+(ERX2+ERX1)*DT*30.
      ERX2=SLCC*(XD-XI(NP1))
      ** OVERHEAD COMPOSITION CONTROL
      ** REFLUX FLOW RATE
      CALL PROPER
      ** THERMODYNAMIC PROPERTIES AT I+1
      57 XTI(N)=XTI(N)
      88 DO 57 N=1,NP1
      90 XTI(N)=(XTI(N)+XTT(N))/2.
      39 DO 90 N=1,NP1
      GO TO 66
      775 FORMAT (1X,4XHT=,10F11.8)
      WRITE(6,775) (XTI(N),N=1,NP1)
      771 FORMAT (1X,3XHT=,10F12.4)
      WRITE(6,771) (XT(N),N=1,NP1)
      )
      40 FORMAT (1X,51H KIT EXCEEDED ITERATION LIMIT
      WRITE(6,40)
      IF (KIT.LE.30) GO TO 39
      56 IF (KIT.LE.52) GO TO 88
      ** CONTROLS NO. OF ITERATIONS
      ** RESET OF X
      ** NEW GUESS OF THE COMPOSITION ON THE TRAYS
      GO TO 66
      55 CONTINUE
      IF (ERR*.GT.0.0001) GO TO 38
      ERRX=ABS((XTI(N)-XT(N))/XTT(N))
      DO 55 N=1,NP1
      751 KIT=KIT+1
      ** CHECK ON CONVERGENCE
      53 XTI(N)=X(N)+DT*DX(N)
      ** NEW X IS CALCULATED

```



```

    SUME1=SUME
    ERX1=ERX2
    F(1)=STEPF
    SF=STEPS
    XD=STEPXD
27 KIT=0
C**  SETTING UP AUTOLOTTER
    DTOUT=DTOUT+DT*60.
    IF (DTOUT.LE.TOUT) GO TO 28
    DTOUT=0.0
    WRITE(3,400) DI,(XT(N),N=1,NTT)
C**  CONTRCLL OF PRINT OUT
28 DK=DK+DT*60.
    IF (DK.LE.STEP) GO TO 48
    DK=0.0
100 CALL TPRINT
C**  CONTROL OF TIME TO FINISH
    IF (DI.GE.TFIN) GO TO 71
    GO TO 48
71 WRITE(3,401)
400 FORMAT (1X,F7.2,10F7.4)
401 FORMAT(6H END  )
35 CONTINUE
    CALL EXIT
    END

```



```

SUMBI=SUME
EXI=EXX
F(1)=STEP
SE=STEP2
XN=STEPXD
27 KIT=C
**C
SETTING UP AUTOPLOTTER
TOUT=TOUT+DT*60.
IF (TOUT.LE.TOUT) GO TO 28
TOUT=0.
WRITE(8,400) DI,(XT(N),N=1,NTT)
**C
CONTROL OF PRINT OUT
IX=IX+1
IF (IX.LE.STEP) GO TO 48
CK=0.0
100 CALL TPRINT
**C
CONTROL OF TIME TO FINISH
IF (OI.CE.TIN) GO TO 41
GO TO 48
41 WRITE(8,401)
400 FORMAT (IX,F7.2,10F7.4)
401 FORMAT(6H END )
32 CONTINUE
CALL EXIT
END

```

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 0.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0114	0.1352	1.1434	73.45	123.05	14.94	0.000003
2	0.0889	0.3542	0.8938	196.50	135.80	3.84	0.000007
3	0.2339	0.6047	0.8255	209.25	154.98	3.75	0.000010
4	0.4139	0.7633	0.9229	228.44	173.49	3.62	0.000008
5	0.5922	0.8458	1.0170	96.45	187.33	3.46	0.000002
6	0.7537	0.8962	0.8278	110.28	197.03	3.30	0.000000
7	0.8440	0.9309	0.7767	119.98	204.06	3.21	-0.000000
8	0.9026	0.9591	0.9212	127.01	210.00	3.15	-0.000001
9	0.9483	0.9776	0.9051	132.96	213.72	3.10	-0.000002
10	0.9776	0.0000	0.0000	136.67	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

136.67	0.0000	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
---------------	-------------------------	-------	-------------	-----------

116.50	204.64	219.65	7490.91	112445.77
--------	--------	--------	---------	-----------

TIME = 5.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0076	0.0917	1.1239	52.41	120.50	14.94	-0.026954
2	0.0639	0.2400	0.8173	172.97	128.56	3.86	-0.254213
3	0.1649	0.5113	0.8760	181.16	146.39	3.80	-0.542095
4	0.3606	0.7227	0.8493	199.34	168.09	3.66	-0.585787
5	0.5559	0.8244	0.9023	89.20	184.06	3.49	-0.656401
6	0.7363	0.8884	0.8145	105.78	196.24	3.32	-0.475004
7	0.8381	0.9279	0.7717	118.42	204.35	3.22	-0.184861
8	0.9004	0.9581	0.9212	126.71	210.87	3.15	-0.077016
9	0.9477	0.9773	0.9051	133.31	214.77	3.10	-0.023817
10	0.9774	0.0000	0.0000	137.24	0.00	2.84	-0.011287

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

137.24	0.0706	132.30	0.5060
--------	--------	--------	--------

STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
---------------	-------------------------	-------	-------------	-----------

116.50	205.44	220.45	7490.91	112445.75
--------	--------	--------	---------	-----------

TABLE U-12 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 0.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD - DERIVATIVE

10	0.9774	0.0000	137.24	0.00	136.67	0.000001
9	0.9477	0.9773	133.31	214.77	135.75	0.000001
8	0.9004	0.9215	126.71	210.87	129.51	0.000001
7	0.8481	0.8777	118.45	207.77	121.25	0.000001
6	0.7863	0.8145	102.77	196.24	105.03	0.000001
5	0.7259	0.7577	87.77	184.77	89.77	0.000001
4	0.6667	0.6977	72.77	172.77	74.77	0.000001
3	0.6089	0.6400	57.77	160.77	59.77	0.000001
2	0.5529	0.5829	42.77	148.77	44.77	0.000001
1	0.5000	0.5317	27.77	136.77	29.77	0.000001

REFLUX ERROR FEED FEED CONC.
136.67 0.0000 136.67 0.2060

STEAM FLOW REBOILER STEAM TEMPERATURE
116.20 219.65 2490.91 112442.77
COEFFICIENT HEAT LOAD

TIME = 2.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

10	0.9774	0.0000	137.24	0.00	136.67	-0.011297
9	0.9477	0.9773	133.31	214.77	135.75	-0.023817
8	0.9004	0.9215	126.71	210.87	129.51	-0.047019
7	0.8481	0.8777	118.45	207.77	121.25	-0.184861
6	0.7863	0.8145	102.77	196.24	105.03	-0.472004
5	0.7259	0.7577	87.77	184.77	89.77	-0.624011
4	0.6667	0.6977	72.77	172.77	74.77	-0.582787
3	0.6089	0.6400	57.77	160.77	59.77	-0.242098
2	0.5529	0.5829	42.77	148.77	44.77	-0.042813
1	0.5000	0.5317	27.77	136.77	29.77	-0.028994

REFLUX ERROR FEED FEED CONC.
137.24 0.0706 137.30 0.2060

STEAM FLOW REBOILER STEAM TEMPERATURE
116.20 202.44 250.45 112442.77
COEFFICIENT HEAT LOAD

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 10.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0061	0.0736	1.1239	57.04	119.48	14.95	-0.008008
2	0.0511	0.1987	0.8173	176.53	126.05	3.86	-0.077505
3	0.1364	0.4551	0.8760	183.15	141.96	3.81	-0.209864
4	0.3201	0.6957	0.8493	199.18	164.59	3.69	-0.332257
5	0.5076	0.8021	0.8909	89.77	179.97	3.53	-0.444313
6	0.7015	0.8743	0.8105	105.56	193.23	3.35	-0.328061
7	0.8206	0.9202	0.7716	119.15	202.51	3.24	-0.183321
8	0.8920	0.9546	0.9212	128.61	210.19	3.16	-0.094759
9	0.9445	0.9759	0.9051	136.39	214.64	3.11	-0.041495
10	0.9764	0.0000	0.0000	140.89	0.00	2.84	-0.034666

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

140.89	0.6752	132.30	0.5060
--------	--------	--------	--------

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.76	220.77	7490.91	112445.75
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TIME = 15.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0059	0.0704	1.1239	62.81	119.29	14.95	0.001996
2	0.0483	0.1891	0.8173	182.10	125.48	3.86	0.002755
3	0.1282	0.4396	0.8760	188.29	140.79	3.82	-0.001754
4	0.3060	0.6871	0.8493	203.60	163.57	3.70	-0.027757
5	0.4862	0.7930	0.8909	94.11	178.36	3.55	-0.083618
6	0.6840	0.8675	0.8105	108.97	191.77	3.37	-0.090418
7	0.8103	0.9158	0.7716	122.47	201.44	3.25	-0.060916
8	0.8864	0.9523	0.9212	132.20	209.70	3.17	-0.034716
9	0.9419	0.9748	0.9051	140.49	214.46	3.11	-0.017961
10	0.9751	0.0000	0.0000	145.27	0.00	2.84	-0.021800

REFLUX	ERROR	FEED	FEED CONC.
--------	-------	------	------------

145.27	1.3947	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
---------------	-------------------------	-------	-------------	-----------

116.50	205.81	220.82	7490.91	112445.75
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TABLE 8-15 CLOSED LOOP - STEP IN FEED FLOW -

TIME = 11.00

PLATE	CONC	CONC	EFFICI	LINUM	VAPOR	HOL	DERIVATIVE
10	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
9	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
8	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
7	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
6	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
5	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
4	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
3	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
2	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
1	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
REFLUX	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
FEED	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
ERROR	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
TEMPERATURE	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
REBOILER	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
STEAM	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
FLW	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
COEFFICIENT	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
HEAT LOAD	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000

TIME = 12.00

PLATE	CONC	CONC	EFFICI	LINUM	VAPOR	HOL	DERIVATIVE
10	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
9	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
8	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
7	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
6	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
5	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
4	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
3	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
2	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
1	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
REFLUX	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
FEED	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
ERROR	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
TEMPERATURE	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
REBOILER	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
STEAM	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
FLW	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
COEFFICIENT	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000
HEAT LOAD	0.0000	0.0000	0.0000	10.00	0.00	0.00	0.000000

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0063	0.0749	1.1239	67.18	119.55	14.95	0.008036
2	0.0508	0.1996	0.8173	186.72	126.11	3.86	0.054103
3	0.1342	0.4520	0.8760	193.25	141.71	3.82	0.132049
4	0.3128	0.6919	0.8493	208.77	164.14	3.70	0.174059
5	0.4908	0.7951	0.8909	98.76	178.80	3.55	0.173710
6	0.6851	0.8680	0.8105	113.27	191.95	3.37	0.102784
7	0.8102	0.9158	0.7716	126.32	201.51	3.25	0.051771
8	0.8863	0.9523	0.9212	135.84	209.76	3.17	0.027273
9	0.9417	0.9748	0.9051	144.06	214.52	3.11	0.011500
10	0.9747	0.0000	0.0000	148.80	0.00	2.84	0.002697

REFLUX ERROR FEED FEED CONC.

148.80 1.6276 132.30 0.5060

STEAM TEMPERATURE
FLCW REBOILER STEAM COEFFICIENT HEAT LOAD

116.50 205.71 220.72 7490.91 112445.75

TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0071	0.0841	1.1239	69.58	120.08	14.94	0.011801
2	0.0568	0.2211	0.8173	189.63	127.42	3.86	0.093458
3	0.1483	0.4805	0.8760	196.92	143.87	3.81	0.188697
4	0.3323	0.7048	0.8493	213.27	165.73	3.68	0.270823
5	0.5119	0.8043	0.8909	102.61	180.39	3.53	0.308871
6	0.6987	0.8734	0.8105	116.99	193.06	3.36	0.208179
7	0.8175	0.9188	0.7716	129.46	202.22	3.24	0.115474
8	0.8903	0.9539	0.9212	138.51	210.07	3.16	0.063585
9	0.9435	0.9756	0.9051	146.29	214.61	3.11	0.030221
10	0.9753	0.0000	0.0000	150.80	0.00	2.84	0.021565

REFLUX ERROR FEED FEED CONC.

150.80 1.3215 132.30 0.5060

STEAM TEMPERATURE
FLCW REBOILER STEAM COEFFICIENT HEAT LOAD

116.50 205.53 220.54 7490.91 112445.75

TABLE 1 - CLOSED LOOP - STEP IN FEED FLOW - 1

TIME = 1.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	WATER	DERIVATIVE
1	0.0000	0.0000	1.1530	67.18	119.77	14.97	0.008036
2	0.0000	0.0000	0.8173	186.77	158.11	3.71	0.004103
3	0.1345	0.4520	0.8760	197.52	141.71	1.71	0.135000
4	0.3128	0.4113	0.8760	209.77	164.14	1.70	0.144000
5	0.4113	0.4113	0.8760	209.77	164.14	1.70	0.144000
6	0.6821	0.4113	0.8760	113.57	191.97	3.37	0.105764
7	0.8173	0.4113	0.8760	186.77	158.11	3.71	0.004103
8	0.8863	0.4520	0.8760	197.52	141.71	1.71	0.135000
9	0.9417	0.4520	0.8760	197.52	141.71	1.71	0.135000
10	0.9747	0.4520	0.8760	197.52	141.71	1.71	0.135000
REFLUX	148.80	1.6576	135.70	0.2060			
FEED							
ERROR							
TEMPERATURE							
STEAM							
FLW							
REBOILER							
STEAM							
COEFFICIENT							
HEAT LOAD							

TIME = 1.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	WATER	DERIVATIVE
1	0.0000	0.0000	1.1530	67.18	119.77	14.97	0.008036
2	0.0000	0.0000	0.8173	186.77	158.11	3.71	0.004103
3	0.1345	0.4520	0.8760	197.52	141.71	1.71	0.135000
4	0.3128	0.4113	0.8760	209.77	164.14	1.70	0.144000
5	0.4113	0.4113	0.8760	209.77	164.14	1.70	0.144000
6	0.6821	0.4113	0.8760	113.57	191.97	3.37	0.105764
7	0.8173	0.4113	0.8760	186.77	158.11	3.71	0.004103
8	0.8863	0.4520	0.8760	197.52	141.71	1.71	0.135000
9	0.9417	0.4520	0.8760	197.52	141.71	1.71	0.135000
10	0.9747	0.4520	0.8760	197.52	141.71	1.71	0.135000
REFLUX	150.80	1.3215	135.30	0.2060			
FEED							
ERROR							
TEMPERATURE							
STEAM							
FLW							
REBOILER							
STEAM							
COEFFICIENT							
HEAT LOAD							

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0082	0.0961	1.1243	69.79	120.76	14.94	0.010753
2	0.0647	0.2446	0.8173	190.52	128.84	3.86	0.095052
3	0.1642	0.5113	0.8760	198.56	146.34	3.80	0.192492
4	0.3549	0.7201	0.8493	215.94	167.72	3.66	0.250185
5	0.5389	0.8158	0.8909	104.81	182.51	3.51	0.316225
6	0.7170	0.8806	0.8105	119.31	194.60	3.34	0.221870
7	0.8278	0.9232	0.7716	131.18	203.27	3.23	0.124484
8	0.8960	0.9563	0.9212	139.73	210.56	3.16	0.071551
9	0.9463	0.9767	0.9051	146.94	214.80	3.10	0.034604
10	0.9764	0.0000	0.0000	151.14	0.00	2.84	0.028994

REFLUX	ERROR	FEED	FEED CONC.
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151.14	0.6987	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.31	220.32	7490.91	112445.75
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0088	0.1044	1.1280	68.51	121.24	14.94	0.005009
2	0.0703	0.2672	0.8326	189.73	130.24	3.85	0.044270
3	0.1794	0.5338	0.8667	198.71	148.29	3.79	0.135786
4	0.3715	0.7336	0.8638	216.68	169.60	3.65	0.149013
5	0.5620	0.8288	0.9216	105.57	184.86	3.49	0.222826
6	0.7359	0.8882	0.8143	120.62	196.17	3.32	0.224622
7	0.8381	0.9278	0.7717	131.71	204.27	3.22	0.130386
8	0.9018	0.9587	0.9212	139.68	210.95	3.15	0.071066
9	0.9492	0.9779	0.9000	146.28	214.86	3.10	0.032742
10	0.9775	0.0000	0.0000	150.16	0.00	2.83	0.026991

REFLUX	ERROR	FEED	FEED CONC.
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150.16	0.0299	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.17	220.18	7490.91	112445.77
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TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 30.0

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
2	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
3	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
4	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
5	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
6	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
7	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
8	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
9	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
10	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
REFLUX	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
FEED	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
ERROR	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
FEED CONC.	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
STEAM	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
REBOILER	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
TEMPERATURE	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
COEFFICIENT	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
HEAT FLOW	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000

TIME = 32.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
2	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
3	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
4	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
5	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
6	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
7	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
8	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
9	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
10	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
REFLUX	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
FEED	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
ERROR	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
FEED CONC.	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
STEAM	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
REBOILER	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
TEMPERATURE	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
COEFFICIENT	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000
HEAT FLOW	0.0088	0.1044	1.1280	0.8731	1.1254	0.0000

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0091	0.1091	1.1302	67.03	121.51	14.94	0.000748
2	0.0736	0.2816	0.8437	188.54	131.14	3.85	0.018403
3	0.1899	0.5486	0.8587	198.16	149.60	3.78	0.068730
4	0.3833	0.7416	0.8802	216.57	170.81	3.64	0.086532
5	0.5784	0.8382	0.9735	105.41	186.73	3.47	0.139783
6	0.7526	0.8953	0.8270	121.20	197.82	3.30	0.151315
7	0.8491	0.9327	0.7767	132.14	205.57	3.21	0.102010
8	0.9090	0.9597	0.8278	139.79	211.13	3.14	0.057869
9	0.9504	0.9784	0.9000	145.28	214.91	3.10	0.026950
10	0.9781	0.0000	0.0000	149.04	0.00	2.83	0.021074

REFLUX ERROR FEED FEED CONC.

149.04 -0.3197 132.30 0.5060

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

116.50 205.09 220.10 7490.91 112445.77

TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0089	0.1071	1.1289	63.57	121.39	14.94	-0.005381
2	0.0729	0.2776	0.8412	184.97	130.89	3.85	-0.031822
3	0.1887	0.5465	0.8596	194.48	149.42	3.78	-0.085941
4	0.3835	0.7415	0.8804	213.07	170.81	3.64	-0.073340
5	0.5822	0.8403	0.9856	102.22	187.19	3.47	-0.043095
6	0.7589	0.8978	0.8278	118.63	198.42	3.30	0.000237
7	0.8538	0.9348	0.7767	129.87	206.13	3.20	0.014363
8	0.9120	0.9610	0.8278	137.56	211.45	3.14	0.013567
9	0.9520	0.9791	0.9000	142.87	215.08	3.10	0.009417
10	0.9789	0.0000	0.0000	146.48	0.00	2.83	0.012876

REFLUX ERROR FEED FEED CONC.

146.48 -0.7682 132.30 0.5060

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

116.50 205.14 220.15 7490.91 112445.77

TABLE U-12 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	FEED-UP	DERIVATIVE
10	0.9781	0.0000	149.64	0.00	2.83	0.05104
9	0.9781	0.0000	142.24	214.21	3.10	0.05090
8	0.9090	0.0000	132.14	211.13	3.14	0.05010
7	0.9090	0.0000	132.14	202.21	3.14	0.05010
6	0.9090	0.0000	132.14	197.82	3.14	0.05010
5	0.9090	0.0000	132.14	197.82	3.14	0.05010
4	0.9090	0.0000	132.14	197.82	3.14	0.05010
3	0.9090	0.0000	132.14	197.82	3.14	0.05010
2	0.9090	0.0000	132.14	197.82	3.14	0.05010
1	0.9090	0.0000	132.14	197.82	3.14	0.05010
REFLUX	142.04	-0.3197	132.30	0.2060		
STEAM						
FLW						
REBOILER						
TEMPERATURE						
COEFFICIENT						
HEAT LOSS						
116.20	250.10	240.01	11242.77			

TIME = 42.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	FEED-UP	DERIVATIVE
10	0.9782	0.0000	146.44	0.00	2.83	0.05287
9	0.9782	0.0000	142.24	212.08	3.10	0.05091
8	0.9091	0.0000	132.14	211.42	3.14	0.05011
7	0.9091	0.0000	132.14	202.87	3.14	0.05011
6	0.9091	0.0000	132.14	197.82	3.14	0.05011
5	0.9091	0.0000	132.14	197.82	3.14	0.05011
4	0.9091	0.0000	132.14	197.82	3.14	0.05011
3	0.9091	0.0000	132.14	197.82	3.14	0.05011
2	0.9091	0.0000	132.14	197.82	3.14	0.05011
1	0.9091	0.0000	132.14	197.82	3.14	0.05011
REFLUX	146.48	-0.3682	132.30	0.2060		
STEAM						
FLW						
REBOILER						
TEMPERATURE						
COEFFICIENT						
HEAT LOSS						
116.20	250.14	240.01	11242.77			

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0083	0.1006	1.1254	61.16	121.01	14.94	-0.007813
2	0.0690	0.2600	0.8284	182.19	129.78	3.85	-0.057717
3	0.1776	0.5304	0.8681	190.99	148.01	3.79	-0.166584
4	0.3729	0.7339	0.8657	209.33	169.73	3.65	-0.164799
5	0.5727	0.8349	0.9555	98.87	186.17	3.48	-0.171379
6	0.7533	0.8955	0.8275	115.46	197.95	3.30	-0.125581
7	0.8518	0.9338	0.7767	127.37	205.96	3.20	-0.060008
8	0.9113	0.9607	0.8278	135.44	211.45	3.14	-0.028303
9	0.9519	0.9790	0.9000	140.96	215.15	3.10	-0.011526
10	0.9791	0.0000	0.0000	144.68	0.00	2.83	-0.004745

REFLUX ERROR FEED FEED CONC.

144.68 -0.8698 132.30 0.5060

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

116.50 205.26 220.28 7490.91 112445.75

TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0078	0.0931	1.1239	60.54	120.58	14.94	-0.006836
2	0.0640	0.2410	0.8173	181.14	128.61	3.86	-0.058344
3	0.1646	0.5109	0.8760	189.20	146.34	3.80	-0.119739
4	0.3597	0.7221	0.8493	207.00	168.09	3.66	-0.151945
5	0.5552	0.8237	0.9003	96.58	184.13	3.49	-0.192814
6	0.7389	0.8892	0.8166	112.79	196.66	3.32	-0.213484
7	0.8442	0.9304	0.7767	125.52	205.24	3.21	-0.115606
8	0.9075	0.9590	0.8278	134.23	211.22	3.15	-0.059804
9	0.9502	0.9783	0.9000	140.27	215.16	3.10	-0.027694
10	0.9786	0.0000	0.0000	144.24	0.00	2.83	-0.020195

REFLUX ERROR FEED FEED CONC.

144.24 -0.5644 132.30 0.5060

STEAM	TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	REBOILER	STEAM		

116.50 205.39 220.40 7490.91 112445.75

TABLE II-1 CLOSED LOOP - STEP IN THE FLOW - RUN 1

TIME = 11.31

PLATE CONC CONCV EFFICI LIQUID VAPOR HOLD-UP RIVAT

1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

144.66 -0.8698 132.30 0.2060

STEAM REFLUX TEMPERATURE COEFFICIENT HEAT LOAD

116.31 144.66 132.30 0.2060

TIME = 22.00

PLATE CONC CONCV EFFICI LIQUID VAPOR HOLD-UP RIVAT

1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX ERROR FEED FEED CONC.

144.24 -0.2664 132.30 0.2060

STEAM REFLUX TEMPERATURE COEFFICIENT HEAT LOAD

116.31 144.24 132.30 0.2060

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0074	0.0884	1.1239	61.26	120.32	14.94	-0.004808
2	0.0607	0.2312	0.8173	181.59	128.02	3.86	-0.040669
3	0.1576	0.4979	0.8760	189.32	145.25	3.80	-0.083864
4	0.3496	0.7154	0.8493	206.59	167.15	3.67	-0.122802
5	0.5413	0.8166	0.8909	96.29	182.70	3.50	-0.167683
6	0.7254	0.8836	0.8105	112.00	195.32	3.33	-0.147801
7	0.8355	0.9265	0.7716	124.76	204.15	3.22	-0.116466
8	0.9014	0.9586	0.9212	133.71	211.11	3.15	-0.090549
9	0.9487	0.9777	0.9000	140.77	215.01	3.10	0.012610
10	0.9777	0.0000	0.0000	144.66	0.00	2.83	-0.000080

REFLUX	ERROR	FEED	FEED CONC.
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144.66	-0.0584	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.47	220.49	7490.91	112445.75
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0070	0.0841	1.1239	62.44	120.07	14.94	-0.001330
2	0.0577	0.2225	0.8173	182.52	127.50	3.86	-0.016633
3	0.1512	0.4854	0.8760	189.95	144.26	3.81	-0.038702
4	0.3397	0.7089	0.8493	206.74	166.28	3.68	-0.069452
5	0.5274	0.8107	0.8909	96.52	181.57	3.52	-0.111262
6	0.7139	0.8792	0.8105	111.91	194.32	3.34	-0.095441
7	0.8279	0.9232	0.7716	124.75	203.29	3.23	-0.061087
8	0.8967	0.9566	0.9212	133.79	210.65	3.16	-0.037390
9	0.9471	0.9771	0.9051	141.19	214.90	3.10	-0.018239
10	0.9773	0.0000	0.0000	145.46	0.00	2.84	-0.016172

REFLUX	ERROR	FEED	FEED CONC.
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145.46	0.1735	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.55	220.56	7490.91	112445.75
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1111 = 3.11

TIME = 65.00

TABLE U-15 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 70.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0071	0.0843	1.1239	64.37	120.08	14.94	0.002135
2	0.0575	0.2224	0.8173	184.45	127.50	3.86	0.012231
3	0.1506	0.4845	0.8760	191.86	144.19	3.81	0.021234
4	0.3379	0.7080	0.8493	208.54	166.16	3.68	0.021657
5	0.5232	0.8089	0.8909	98.19	181.26	3.52	0.005011
6	0.7096	0.8775	0.8105	113.28	193.96	3.34	-0.010705
7	0.8249	0.9219	0.7716	126.00	202.98	3.23	-0.012114
8	0.8948	0.9558	0.9212	135.03	210.48	3.16	-0.008957
9	0.9461	0.9766	0.9051	142.54	214.82	3.10	-0.005873
10	0.9767	0.0000	0.0000	146.89	0.00	2.84	-0.008176

REFLUX ERROR FEED FEED CONC.

146.89 0.4809 132.30 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.54	220.55	7490.91	112445.75
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TIME = 75.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0074	0.0873	1.1239	65.75	120.26	14.94	0.004262
2	0.0594	0.2282	0.8173	186.00	127.84	3.86	0.030612
3	0.1542	0.4917	0.8760	193.57	144.76	3.80	0.059733
4	0.3425	0.7111	0.8493	210.45	166.57	3.67	0.081112
5	0.5273	0.8107	0.8909	99.90	181.58	3.52	0.086561
6	0.7114	0.8783	0.8105	114.83	194.12	3.34	0.050525
7	0.8256	0.9222	0.7716	127.32	203.04	3.23	0.024965
8	0.8950	0.9559	0.9212	136.22	210.50	3.16	0.012508
9	0.9461	0.9766	0.9051	143.66	214.81	3.10	0.005060
10	0.9766	0.0000	0.0000	147.97	0.00	2.84	0.001769

REFLUX ERROR FEED FEED CONC.

147.97 0.5548 132.30 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.48	220.49	7490.91	112445.75
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TABLE 11-12 CLOSED LOOP - STEP IN FEED FLOW - RUN 1

TIME = 10.00							
PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	DIFFERENTIAL	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	0.4800	135.30	0.5000				
FEED							
ERROR							
FEED CONC.							
STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD				
FLW	RECIRC	STEAM					
116.50	202.48	250.49	11545.75				

TIME = 12.00

TIME = 12.00											
PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	DIFFERENTIAL	DERIVATIVE				
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
REFLUX	0.5200	135.30	0.5000								
FEED											
ERROR											
FEED CONC.											
STEAM	TEMPERATURE	COEFFICIENT	HEAT LOAD								
FLW	RECIRC	STEAM									
116.50	202.48	250.49	11545.75								

TABLE U-15 CLOSED LCOP - STEP IN FEED FLOW - RUN 1

TIME = 80.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0077	0.0917	1.1239	66.39	120.51	14.94	0.004710
2	0.0623	0.2368	0.8173	186.88	128.36	3.86	0.036022
3	0.1598	0.5031	0.8760	194.72	145.66	3.80	0.072300
4	0.3504	0.7167	0.8493	211.97	167.28	3.67	0.104195
5	0.5363	0.8146	0.8909	101.21	182.29	3.51	0.122755
6	0.7171	0.8805	0.8105	116.10	194.60	3.34	0.080708
7	0.8286	0.9235	0.7716	128.34	203.35	3.23	0.043984
8	0.8967	0.9566	0.9212	137.04	210.62	3.16	0.024987
9	0.9468	0.9769	0.9051	144.29	214.84	3.10	0.011647
10	0.9768	0.0000	0.0000	148.50	0.00	2.84	0.008523

REFLUX	ERROR	FEED	FEED CONC.
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148.50	0.4259	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.40	220.41	7490.91	112445.77
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TIME = 85.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0081	0.0959	1.1240	66.17	120.75	14.94	0.003459
2	0.0651	0.2452	0.8173	186.91	128.88	3.86	0.030454
3	0.1657	0.5135	0.8760	195.03	146.54	3.80	0.062112
4	0.3582	0.7220	0.8493	212.65	167.99	3.66	0.080894
5	0.5460	0.8190	0.8909	101.74	183.11	3.50	0.103494
6	0.7240	0.8833	0.8105	116.76	195.19	3.33	0.078460
7	0.8324	0.9252	0.7716	128.77	203.77	3.22	0.044703
8	0.8989	0.9575	0.9212	137.29	210.81	3.15	0.026076
9	0.9479	0.9774	0.9051	144.31	214.92	3.10	0.012706
10	0.9773	0.0000	0.0000	148.41	0.00	2.84	0.010858

REFLUX	ERROR	FEED	FEED CONC.
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148.41	0.1864	132.30	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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116.50	205.32	220.33	7490.91	112445.77
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TABLE 10-15 CLOSED LOOP - STEP IN FEED FLOW

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT LOAD
10	0.0000	0.0000	0.0000	148.20	0.00	0.00823
9	0.0000	0.0000	0.0000	144.31	214.84	0.01047
8	0.0000	0.0000	0.0000	137.04	210.02	0.00923
7	0.0000	0.0000	0.0000	128.34	210.02	0.00923
6	0.0000	0.0000	0.0000	116.10	194.60	0.00923
5	0.0000	0.0000	0.0000	101.21	182.29	0.00923
4	0.0000	0.0000	0.0000	86.17	150.71	0.00923
3	0.0000	0.0000	0.0000	71.13	128.34	0.00923
2	0.0000	0.0000	0.0000	56.13	101.21	0.00923
1	0.0000	0.0000	0.0000	41.13	71.13	0.00923
REFLUX	0.4250	131.30	0.2060			
STEAM						
TEMPERATURE						
RECYCLER						
STEAM						
COEFFICIENT						
HEAT LOAD						

TIME = 12.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT LOAD
10	0.0000	0.0000	0.0000	148.41	0.00	0.00823
9	0.0000	0.0000	0.0000	144.31	214.84	0.01047
8	0.0000	0.0000	0.0000	137.04	210.02	0.00923
7	0.0000	0.0000	0.0000	128.34	210.02	0.00923
6	0.0000	0.0000	0.0000	116.10	194.60	0.00923
5	0.0000	0.0000	0.0000	101.21	182.29	0.00923
4	0.0000	0.0000	0.0000	86.17	150.71	0.00923
3	0.0000	0.0000	0.0000	71.13	128.34	0.00923
2	0.0000	0.0000	0.0000	56.13	101.21	0.00923
1	0.0000	0.0000	0.0000	41.13	71.13	0.00923
REFLUX	0.1861	117.30	0.2060			
STEAM						
TEMPERATURE						
RECYCLER						
STEAM						
COEFFICIENT						
HEAT LOAD						

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0093	0.0922	1.0907	64.43	122.09	14.94	0.000002
2	0.0635	0.2528	0.8520	186.53	130.76	3.86	0.000004
3	0.1724	0.5188	0.8609	195.19	148.35	3.79	0.000009
4	0.3645	0.7234	0.8336	212.78	169.44	3.66	0.000009
5	0.5535	0.8230	0.8981	101.58	184.87	3.49	0.000002
6	0.7333	0.8884	0.8430	117.01	197.01	3.32	0.000002
7	0.8415	0.9288	0.7630	129.15	204.94	3.21	-0.000000
8	0.9047	0.9584	0.8554	137.07	210.81	3.15	-0.000001
9	0.9493	0.9776	0.8731	142.95	214.23	3.10	-0.000000
10	0.9776	0.0000	0.0000	146.36	0.00	2.83	-0.000001

REFLUX ERROR FEED FEED CONC.

146.36 0.1864 132.30 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	205.05	219.89	7709.41	114376.18
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0151	0.1379	1.0907	85.31	124.04	14.93	0.059932
2	0.0922	0.3521	0.8677	209.23	136.31	3.84	0.311135
3	0.2321	0.6050	0.8348	221.33	155.60	3.75	0.562599
4	0.4143	0.7632	0.9201	240.25	173.86	3.62	0.530925
5	0.5919	0.8446	0.9985	107.56	187.32	3.46	0.531120
6	0.7528	0.8972	0.8626	120.52	197.16	3.30	0.337877
7	0.8481	0.9333	0.8019	130.03	204.22	3.21	0.159864
8	0.9081	0.9603	0.8716	136.93	209.70	3.14	0.083353
9	0.9508	0.9782	0.8731	142.32	212.38	3.10	0.034226
10	0.9779	0.0000	0.0000	144.97	0.00	2.83	0.022491

REFLUX ERROR FEED FEED CONC.

144.97 -0.1971 150.50 0.5060

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.92	218.76	7709.41	114376.18
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TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0194	0.1711	1.0907	81.16	125.44	14.92	0.038510
2	0.1143	0.4060	0.8677	206.52	139.41	3.83	0.200541
3	0.2700	0.6506	0.8348	220.37	160.24	3.73	0.346908
4	0.4498	0.7802	0.9201	240.95	176.08	3.58	0.313187
5	0.6258	0.8573	1.0023	106.02	189.25	3.43	0.290323
6	0.7740	0.9057	0.8635	118.92	198.51	3.28	0.181221
7	0.8597	0.9384	0.8019	128.00	205.09	3.19	0.105010
8	0.9143	0.9630	0.8716	134.47	210.50	3.14	0.059104
9	0.9536	0.9795	0.8731	139.81	212.08	3.10	0.029319
10	0.9791	0.0000	0.0000	141.36	0.00	2.83	0.027957

REFLUX	ERROR	FEED	FEED CONC.
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141.36	-0.8598	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.11	217.95	7709.41	114376.18
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0214	0.1865	1.0907	76.34	126.11	14.92	0.009171
2	0.1249	0.4316	0.8677	202.43	140.96	3.82	0.053779
3	0.2891	0.6694	0.8348	217.25	162.03	3.71	0.102482
4	0.4651	0.7873	0.9201	238.24	177.00	3.57	0.076551
5	0.6407	0.8628	1.0023	102.65	190.10	3.41	0.078336
6	0.7836	0.9095	0.8635	115.67	199.14	3.27	0.053474
7	0.8654	0.9408	0.8019	124.66	205.54	3.19	0.032947
8	0.9176	0.9644	0.8716	131.03	210.96	3.13	0.019093
9	0.9553	0.9802	0.8731	136.42	211.93	3.09	0.010431
10	0.9800	0.0000	0.0000	137.39	0.00	2.83	0.014165

REFLUX	ERROR	FEED	FEED CONC.
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137.39	-1.3793	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	202.78	217.62	7709.41	114376.18
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TABLE 1-16 CLOSED LOOP - STEP IN FEED FLOW - CONT. 2

TIME = 11.1

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	1 - 2	DERIVATIVE
10	0.9791	0.0000	0.0000	141.36	5.83	0.021957
9	0.9716	0.9792	0.8731	139.81	512.16	0.028819
8	0.9143	0.9630	0.8716	134.47	510.16	0.028474
7	0.8297	0.9384	0.8019	128.00	507.00	0.025011
6	0.7740	0.9057	0.8847	118.92	198.21	0.181251
5	0.6228	0.8273	1.0023	106.02	189.22	0.200323
4	0.7778	0.7802	0.0201	240.92	176.16	0.113487
3	0.2706	0.6206	0.8348	220.37	160.24	0.240377
2	0.1147	0.0000	0.8677	206.22	139.41	0.100000
1	0.0194	0.1711	1.0907	81.16	122.44	0.032210
						14.92
						3.83
						3.73
						3.26
						0.200323
						0.181251
						0.025011
						0.028474
						0.028819
						0.021957
REFLUX	-0.8293	120.20	FEED	0.2060	FEED CONC.	
STEAM			TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	118.20	203.11	217.92	2709.41	114376.11	

TIME = 12.1

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	1 - 2	DERIVATIVE
10	0.9887	0.0000	0.0000	137.39	5.77	0.021957
9	0.9716	0.9802	0.8731	136.42	511.93	0.010431
8	0.9176	0.9644	0.8716	131.03	510.16	0.010494
7	0.8297	0.9408	0.8019	124.66	507.00	0.028474
6	0.7778	0.9092	0.8832	112.67	177.17	0.028474
5	0.6228	0.8628	1.0023	102.62	190.16	0.078336
4	0.7778	0.7873	0.0201	237.24	177.17	0.105207
3	0.2891	0.6694	0.8348	217.22	160.24	0.102407
2	0.1247	0.0000	0.8677	207.44	140.24	0.028474
1	0.0194	0.1862	1.0907	76.34	126.11	0.021957
						14.92
						3.82
						3.71
						3.27
						0.078336
						0.028474
						0.028474
						0.010494
						0.010431
						0.021957
REFLUX	-1.3793	120.20	FEED	0.2060	FEED CONC.	
STEAM			TEMPERATURE		COEFFICIENT	HEAT LOAD
FLCW	118.20	202.77	217.92	2709.41	114376.11	

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0210	0.1840	1.0907	72.02	126.00	14.92	-0.016259
2	0.1235	0.4277	0.8677	198.06	140.74	3.82	-0.083216
3	0.2873	0.6677	0.8348	212.85	161.86	3.72	-0.136147
4	0.4638	0.7867	0.9201	234.06	176.87	3.57	-0.099355
5	0.6402	0.8626	1.0023	98.65	190.01	3.41	-0.084971
6	0.7837	0.9095	0.8635	111.87	199.08	3.27	-0.048496
7	0.8655	0.9409	0.8019	120.99	205.49	3.19	-0.029385
8	0.9175	0.9643	0.8716	127.43	210.89	3.13	-0.018561
9	0.9553	0.9802	0.8731	132.85	211.86	3.09	-0.009437
10	0.9802	0.0000	0.0000	133.84	0.00	2.83	-0.003278

REFLUX	ERROR	FEED	FEED CONC.
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133.84	-1.5107	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	202.84	217.68	7709.41	114376.16
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0189	0.1679	1.0907	68.99	125.33	14.92	-0.030661
2	0.1126	0.4011	0.8677	194.38	139.16	3.83	-0.161683
3	0.2691	0.6493	0.8348	208.31	160.12	3.73	-0.271569
4	0.4500	0.7802	0.9201	229.46	176.05	3.58	-0.235983
5	0.6281	0.8581	1.0023	95.09	189.36	3.42	-0.200320
6	0.7763	0.9066	0.8635	108.59	198.66	3.28	-0.121613
7	0.8610	0.9390	0.8019	118.01	205.19	3.19	-0.073921
8	0.9148	0.9632	0.8716	124.62	210.54	3.14	-0.045825
9	0.9539	0.9795	0.8731	130.01	212.03	3.10	-0.024343
10	0.9798	0.0000	0.0000	131.53	0.00	2.83	-0.017744

REFLUX	ERROR	FEED	FEED CONC.
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131.53	-1.2523	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.20	218.04	7709.41	114376.18
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133.84 -1.2107 150.20 0.2080

TIME = 52.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HELD-UP DERIVA
1	0.0184	1.0907	0.8499	11.751	14.95
2	0.1152	0.8044	0.7491	11.711	3.83
3	0.2880	0.8488	0.7805	11.015	3.73
4	0.4520	0.8050	0.8259	11.441	3.62
5	0.6257	1.0053	0.7738	11.441	3.41
6	0.7763	0.8835	0.7701	11.441	3.28
7	0.8800	0.8019	0.7111	11.441	3.19
8	0.9140	0.8118	0.6541	11.024	3.14
9	0.9539	0.7731	0.6001	11.441	3.11
10	0.9790	0.7000	0.5131	11.441	3.03

131.181 -1.5253 150.5 2000.

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0163	0.1469	1.0907	67.95	124.44	14.93	-0.031236
2	0.0983	0.3661	0.8677	192.46	137.15	3.84	-0.170667
3	0.2446	0.6209	0.8348	205.25	157.23	3.75	-0.294805
4	0.4281	0.7698	0.9201	225.53	174.77	3.60	-0.265127
5	0.6085	0.8509	1.0023	92.80	188.35	3.44	-0.248523
6	0.7643	0.9019	0.8635	106.61	198.00	3.29	-0.156123
7	0.8538	0.9358	0.8019	116.42	204.73	3.20	-0.094878
8	0.9103	0.9613	0.8716	123.24	210.00	3.14	-0.058083
9	0.9515	0.9785	0.8731	128.58	212.32	3.10	-0.031013
10	0.9788	0.0000	0.0000	130.94	0.00	2.83	-0.025894

REFLUX	ERROR	FEED	FEED CONC.
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130.94	-0.7172	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.71	218.54	7709.41	114376.18
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0141	0.1297	1.0907	68.58	123.70	14.93	-0.020254
2	0.0869	0.3341	0.8651	192.32	135.34	3.84	-0.102077
3	0.2230	0.5928	0.8384	204.01	154.44	3.76	-0.235907
4	0.4075	0.7584	0.9089	223.28	173.35	3.62	-0.214688
5	0.5883	0.8428	0.9890	91.86	187.05	3.46	-0.244430
6	0.7514	0.8967	0.8612	105.79	197.13	3.30	-0.173139
7	0.8461	0.9323	0.7960	116.04	204.04	3.21	-0.091675
8	0.9056	0.9592	0.8668	123.04	209.25	3.15	-0.063698
9	0.9489	0.9775	0.8859	128.32	212.55	3.10	-0.043952
10	0.9778	0.0000	0.0000	131.67	0.00	2.83	-0.017064

REFLUX	ERROR	FEED	FEED CONC.
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131.67	-0.1091	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.12	218.96	7709.41	114376.18
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TABLE 1 - CLOSURE LOOP - STEP IN FEED FLOW - RUN 2

TIME = 37.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0163	0.1460	1.0007	15.92	150.44	14.93	-0.0001
2	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
3	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
4	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
5	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
6	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
7	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
8	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
9	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
10	0.0283	0.1460	1.0007	15.92	150.44	14.93	-0.0001
REFLUX	130.44	-0.1115	150.50	0.2060			
FEED							
ERROR							
TEMPERATURE							
STEAM							
FLW							
REBOILER							
STEAM							
COEFFICIENT							
HEAT LOAD							
118.50	503.71	518.5	1700.41	114376.11			

TIME = 37.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0141	0.1597	1.0007	18.82	153.70	14.93	-0.0001
2	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
3	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
4	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
5	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
6	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
7	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
8	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
9	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
10	0.0283	0.1597	1.0007	18.82	153.70	14.93	-0.0001
REFLUX	131.67	-1.1091	150.5	0.2060			
FEED							
ERROR							
TEMPERATURE							
STEAM							
FLW							
REBOILER							
STEAM							
COEFFICIENT							
HEAT LOAD							
118.50	503.71	518.5	1700.41	114376.11			

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0133	0.1232	1.0907	72.27	123.41	14.93	-0.000555
2	0.0826	0.3196	0.8627	195.68	134.50	3.85	-0.005399
3	0.2124	0.5793	0.8432	206.78	153.15	3.77	-0.020921
4	0.3973	0.7515	0.8911	225.44	172.40	3.63	-0.028045
5	0.5749	0.8358	0.9541	94.22	185.83	3.47	-0.062821
6	0.7404	0.8919	0.8502	107.70	196.15	3.31	-0.074745
7	0.8397	0.9284	0.7630	118.09	203.08	3.22	-0.056148
8	0.9005	0.9567	0.8554	125.08	208.21	3.15	-0.038663
9	0.9460	0.9763	0.8859	130.25	212.55	3.10	-0.023216
10	0.9766	0.0000	0.0000	134.62	0.00	2.84	-0.025397

REFLUX	ERROR	FEED	FEED CONC.
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134.62	0.5543	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.28	219.12	7709.41	114376.18
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0137	0.1269	1.0907	75.57	123.57	14.93	0.011450
2	0.0848	0.3277	0.8640	199.11	134.96	3.84	0.055372
3	0.2169	0.5853	0.8412	210.48	153.66	3.76	0.120196
4	0.4007	0.7539	0.8969	229.10	172.66	3.63	0.101471
5	0.5765	0.8367	0.9581	97.52	185.88	3.47	0.093052
6	0.7395	0.8915	0.8493	110.65	195.95	3.32	0.052322
7	0.8382	0.9278	0.7630	120.67	202.76	3.22	0.020577
8	0.8992	0.9562	0.8554	127.46	207.79	3.15	0.007570
9	0.9450	0.9759	0.8859	132.48	212.40	3.11	0.001178
10	0.9760	0.0000	0.0000	137.09	0.00	2.84	-0.005205

REFLUX	ERROR	FEED	FEED CONC.
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137.09	0.9262	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.19	219.03	7709.41	114376.16
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TABLE 4-16 CLOSED LOOP - STEP IN FEED FLOW - 40

TIME = 40.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	HOI
1	0.0137	0.1535	1.0907	75.57	153.41
2	0.0847	0.3237	0.8640	199.11	134.96
3	0.2169	0.5893	0.8415	510.44	153.18
4	0.4007	0.7999	0.8494	529.10	155.66
5	0.5765	0.8967	0.9281	97.55	185.88
6	0.7392	0.9717	0.8493	110.65	197.77
7	0.8878	0.9278	0.7630	150.67	205.77
8	0.8993	0.9965	0.8984	157.46	207.79
9	0.9476	0.9759	0.8859	135.48	215.40
10	0.9776	0.9999	0.9999	137.09	0.00
REFLUX	0.5243				
FEED					0.5060
ERROR					
TEMPERATURE					
STEAM					
REBILIER					
FLW	118.50	504.58	519.15	7709.41	11437.11
COEFFICIENT					
HEAT LOSS					

TIME = 40.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	HOI
1	0.0137	0.1535	1.0907	75.57	153.41
2	0.0847	0.3237	0.8640	199.11	134.96
3	0.2169	0.5893	0.8415	510.44	153.18
4	0.4007	0.7999	0.8494	529.10	155.66
5	0.5765	0.8967	0.9281	97.55	185.88
6	0.7392	0.9717	0.8493	110.65	197.77
7	0.8878	0.9278	0.7630	150.67	205.77
8	0.8993	0.9965	0.8984	157.46	207.79
9	0.9476	0.9759	0.8859	135.48	215.40
10	0.9776	0.9999	0.9999	137.09	0.00
REFLUX	0.5243				
FEED					0.5060
ERROR					
TEMPERATURE					
STEAM					
REBILIER					
FLW	118.50	504.19	519.03	7709.41	11437.11
COEFFICIENT					
HEAT LOSS					

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0149	0.1360	1.0907	77.42	123.96	14.93	0.015876
2	0.0907	0.3479	0.8672	201.34	136.10	3.84	0.085545
3	0.2299	0.6021	0.8354	213.44	155.30	3.76	0.168731
4	0.4121	0.7619	0.9170	232.52	173.66	3.62	0.158287
5	0.5885	0.8429	0.9895	100.25	186.87	3.46	0.179169
6	0.7478	0.8952	0.8575	113.30	196.56	3.31	0.130775
7	0.8425	0.9300	0.7700	122.86	203.16	3.21	0.069373
8	0.9015	0.9572	0.8554	129.39	208.10	3.15	0.052350
9	0.9460	0.9763	0.8859	134.27	212.31	3.10	0.021877
10	0.9761	0.0000	0.0000	138.46	0.00	2.84	0.013341

REFLUX	ERROR	FEED	FEED CONC.
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138.46	0.8235	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.96	218.80	7709.41	114376.18
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0162	0.1463	1.0907	76.67	124.40	14.93	0.012688
2	0.0976	0.3650	0.8677	201.05	137.05	3.84	0.069190
3	0.2421	0.6182	0.8348	213.66	156.92	3.75	0.122603
4	0.4247	0.7683	0.9201	233.45	174.49	3.61	0.115331
5	0.6016	0.8484	1.0023	100.42	187.79	3.45	0.123157
6	0.7573	0.8992	0.8635	113.60	197.31	3.30	0.086582
7	0.8482	0.9335	0.8019	123.04	203.96	3.21	0.057602
8	0.9062	0.9595	0.8716	129.63	209.02	3.15	0.039920
9	0.9485	0.9774	0.8859	134.64	212.27	3.10	0.031335
10	0.9771	0.0000	0.0000	137.86	0.00	2.84	0.028736

REFLUX	ERROR	FEED	FEED CONC.
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137.86	0.3042	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.72	218.55	7709.41	114376.16
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TABLE 4-15 CLOSED LOOP - STEP IN FEED FLOW - 40

TIME = 55.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	FEED FLOW
1	0.0149	0.1361	17.45	153.77	14.75	0.015079
2	0.0207	0.3479	201.34	136.11	3.84	0.082242
3	0.02299	0.6021	213.44	122.77	3.76	0.166731
4	0.04121	0.7619	232.25	117.77	3.62	0.152283
5	0.02882	0.8422	111.25	117.77	3.46	0.172162
6	0.0441	0.8222	113.30	106.26	3.31	0.136172
7	0.0422	0.9300	0.1700	203.16	3.21	0.062373
8	0.0212	0.9272	0.8224	204.10	3.12	0.022220
9	0.046	0.9763	0.8829	215.31	3.10	0.071673
10	0.0261	0.0000	0.0000	138.46	2.84	0.013341

REFLUX 138.46 ERROR 0.0000 FEED 120.50 FEED FLOW 0.5000

STEAM FLOW REBOILER STEAM TEMPERATURE 218.73 COEFFICIENT 1709.41 HEAT LOAD 114326.18

TIME = 55.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	FEED FLOW
1	0.0162	0.1463	17.47	154.47	14.93	0.015088
2	0.0216	0.3479	201.37	137.02	3.84	0.082190
3	0.0233	0.6182	213.66	126.22	3.72	0.152007
4	0.0401	0.7683	232.44	117.77	3.61	0.113331
5	0.0201	0.8422	111.25	117.77	3.42	0.153123
6	0.0423	0.8222	113.30	107.31	3.31	0.136172
7	0.0422	0.9300	0.1704	203.16	3.21	0.051202
8	0.0200	0.9272	0.8224	204.10	3.12	0.022220
9	0.046	0.9774	0.8829	215.31	3.11	0.031332
10	0.0261	0.0000	0.0000	137.86	2.84	0.020736

REFLUX 137.41 ERROR 0.3042 FEED 121.2 FEED CONC. 0.5000

STEAM FLOW REBOILER STEAM TEMPERATURE 218.73 COEFFICIENT 1709.41 HEAT LOAD 114326.18

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0172	0.1536	1.0907	75.70	124.72	14.92	0.007867
2	0.1027	0.3772	0.8677	200.40	137.74	3.83	0.042396
3	0.2509	0.6283	0.8348	213.40	157.95	3.74	0.075324
4	0.4328	0.7721	0.9201	233.55	175.01	3.60	0.070144
5	0.6102	0.8515	1.0023	100.05	188.32	3.44	0.074414
6	0.7634	0.9016	0.8635	113.29	197.78	3.29	0.055151
7	0.8524	0.9353	0.8019	122.70	204.40	3.20	0.038476
8	0.9091	0.9608	0.8716	129.28	209.58	3.14	0.026169
9	0.9505	0.9781	0.8731	134.43	212.17	3.10	0.015660
10	0.9779	0.0000	0.0000	137.00	0.00	2.83	0.016493

REFLUX	ERROR	FEED	FEED CONC.
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137.00	-0.1755	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.54	218.38	7709.41	114376.18
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0174	0.1559	1.0907	74.10	124.82	14.92	-0.000812
2	0.1043	0.3811	0.8677	198.92	137.97	3.83	-0.003317
3	0.2539	0.6318	0.8348	212.07	158.30	3.74	-0.002523
4	0.4357	0.7735	0.9201	232.41	175.20	3.60	0.000257
5	0.6136	0.8528	1.0023	98.81	188.54	3.44	0.007622
6	0.7662	0.9026	0.8635	112.14	197.99	3.29	0.010335
7	0.8544	0.9361	0.8019	121.58	204.62	3.20	0.008942
8	0.9105	0.9614	0.8716	128.19	209.85	3.14	0.006721
9	0.9514	0.9785	0.8731	133.42	212.17	3.10	0.004645
10	0.9784	0.0000	0.0000	135.74	0.00	2.83	0.006805

REFLUX	ERROR	FEED	FEED CONC.
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135.74	-0.4533	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.48	218.32	7709.41	114376.18
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TABLE 1-18 CLOSED LOOP - STEP IN FEED FLW - RUN 5

TIME = 50.0

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT-UP
1	0.0175	0.1529	1.0907	154.75	14.95	0.000815
2	0.0100	0.1375	0.8848	137.97	14.95	0.003317
3	0.0250	0.6283	0.8348	153.40	127.97	0.000000
4	0.4828	0.1781	0.9201	153.25	152.01	0.00527
5	0.6108	0.8212	1.0053	188.35	14.95	0.000000
6	0.4828	0.1781	0.8348	153.25	152.01	0.003317
7	0.0250	0.6283	0.8348	153.40	127.97	0.000000
8	0.0100	0.1375	0.8848	137.97	14.95	0.003317
9	0.0175	0.1529	1.0907	154.75	14.95	0.000815
10	0.0175	0.1529	1.0907	154.75	14.95	0.000815

REFLUX 137.00 -0.1529 150.50 0.0000

STEAM REBOILER TEMPERATURE COEFFICIENT HEAT FLW

118.20 218.38 2709.41 114356.1

TIME = 62.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT-UP
1	0.0175	0.1529	1.0907	154.75	14.95	0.000815
2	0.0100	0.1375	0.8848	137.97	14.95	0.003317
3	0.0250	0.6283	0.8348	153.40	127.97	0.000000
4	0.4828	0.1781	0.9201	153.25	152.01	0.00527
5	0.6108	0.8212	1.0053	188.35	14.95	0.000000
6	0.4828	0.1781	0.8348	153.25	152.01	0.003317
7	0.0250	0.6283	0.8348	153.40	127.97	0.000000
8	0.0100	0.1375	0.8848	137.97	14.95	0.003317
9	0.0175	0.1529	1.0907	154.75	14.95	0.000815
10	0.0175	0.1529	1.0907	154.75	14.95	0.000815

REFLUX 132.74 -0.4523 150.50 0.0000

STEAM REBOILER TEMPERATURE COEFFICIENT HEAT FLW

118.20 203.48 2709.41 114356.1

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0171	0.1530	1.0907	72.69	124.70	14.92	-0.007819
2	0.1023	0.3762	0.8677	197.40	137.69	3.83	-0.041057
3	0.2508	0.6281	0.8348	210.42	157.94	3.74	-0.068063
4	0.4331	0.7722	0.9201	230.72	175.05	3.60	-0.059228
5	0.6117	0.8521	1.0023	97.38	188.46	3.44	-0.050022
6	0.7653	0.9023	0.8635	110.84	197.98	3.29	-0.027911
7	0.8540	0.9360	0.8019	120.38	204.63	3.20	-0.015481
8	0.9104	0.9613	0.8716	127.05	209.88	3.14	-0.008846
9	0.9514	0.9785	0.8731	132.31	212.22	3.10	-0.004115
10	0.9785	0.0000	0.0000	134.65	0.00	2.83	-0.001480

REFLUX	ERROR	FEED	FEED CONC.
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134.65	-0.5135	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.56	218.39	7709.41	114376.18
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0162	0.1465	1.0907	71.86	124.42	14.93	-0.011210
2	0.0980	0.3655	0.8677	196.31	137.10	3.84	-0.059944
3	0.2435	0.6196	0.8348	209.01	157.09	3.75	-0.101775
4	0.4267	0.7692	0.9201	229.07	174.67	3.60	-0.090384
5	0.6059	0.8500	1.0023	96.23	188.16	3.44	-0.082430
6	0.7620	0.9010	0.8635	109.80	197.78	3.29	-0.050504
7	0.8520	0.9351	0.8019	119.47	204.50	3.20	-0.030152
8	0.9092	0.9608	0.8716	126.22	209.74	3.14	-0.018192
9	0.9508	0.9782	0.8731	131.48	212.29	3.10	-0.009445
10	0.9783	0.0000	0.0000	134.04	0.00	2.83	-0.007081

REFLUX	ERROR	FEED	FEED CONC.
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134.04	-0.4060	150.50	0.5060
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.71	218.55	7709.41	114376.18
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TABLE U-10 CLOSED LOOP - TEM IN FEED FLOW

TIME = 7.00

PLATE	CONCX	EFFICI	LIQUID	VAPOUR	HOLD-UP	DERIVATIVE
1	0.0171	0.153	1.0907	154.70	14.95	-0.0181
2	0.0171	0.153	1.0907	154.70	14.95	-0.0181
3	0.0171	0.153	1.0907	154.70	14.95	-0.0181
4	0.0171	0.153	1.0907	154.70	14.95	-0.0181
5	0.0171	0.153	1.0907	154.70	14.95	-0.0181
6	0.0171	0.153	1.0907	154.70	14.95	-0.0181
7	0.0171	0.153	1.0907	154.70	14.95	-0.0181
8	0.0171	0.153	1.0907	154.70	14.95	-0.0181
9	0.0171	0.153	1.0907	154.70	14.95	-0.0181
10	0.0171	0.153	1.0907	154.70	14.95	-0.0181
REFLUX	0.0171	0.153	1.0907	154.70	14.95	-0.0181
FEED	0.0171	0.153	1.0907	154.70	14.95	-0.0181
FEED CONC.	0.0171	0.153	1.0907	154.70	14.95	-0.0181
STEAM	0.0171	0.153	1.0907	154.70	14.95	-0.0181
RECYCLER	0.0171	0.153	1.0907	154.70	14.95	-0.0181
TEMPERATURE	0.0171	0.153	1.0907	154.70	14.95	-0.0181
COEFFICIENT	0.0171	0.153	1.0907	154.70	14.95	-0.0181
HEAT LOAD	0.0171	0.153	1.0907	154.70	14.95	-0.0181
118.50	2.71	518.25	1700.41	114378.11		

TIME = 7.00

PLATE	CONCX	EFFICI	LIQUID	VAPOUR	HOLD-UP	DERIVATIVE
1	0.0171	0.153	1.0907	154.70	14.95	-0.0181
2	0.0171	0.153	1.0907	154.70	14.95	-0.0181
3	0.0171	0.153	1.0907	154.70	14.95	-0.0181
4	0.0171	0.153	1.0907	154.70	14.95	-0.0181
5	0.0171	0.153	1.0907	154.70	14.95	-0.0181
6	0.0171	0.153	1.0907	154.70	14.95	-0.0181
7	0.0171	0.153	1.0907	154.70	14.95	-0.0181
8	0.0171	0.153	1.0907	154.70	14.95	-0.0181
9	0.0171	0.153	1.0907	154.70	14.95	-0.0181
10	0.0171	0.153	1.0907	154.70	14.95	-0.0181
REFLUX	0.0171	0.153	1.0907	154.70	14.95	-0.0181
FEED	0.0171	0.153	1.0907	154.70	14.95	-0.0181
FEED CONC.	0.0171	0.153	1.0907	154.70	14.95	-0.0181
STEAM	0.0171	0.153	1.0907	154.70	14.95	-0.0181
RECYCLER	0.0171	0.153	1.0907	154.70	14.95	-0.0181
TEMPERATURE	0.0171	0.153	1.0907	154.70	14.95	-0.0181
COEFFICIENT	0.0171	0.153	1.0907	154.70	14.95	-0.0181
HEAT LOAD	0.0171	0.153	1.0907	154.70	14.95	-0.0181
118.50	2.71	518.25	1700.41	114378.11		

TABLE U-16 CLOSED LOOP - STEP IN FEED FLOW - RUN 2

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0153	0.1392	1.0907	71.76	124.10	14.93	-0.010245
2	0.0930	0.3534	0.8677	195.89	136.42	3.84	-0.053685
3	0.2351	0.6089	0.8348	208.24	156.03	3.75	-0.091022
4	0.4187	0.7654	0.9201	227.90	174.19	3.61	-0.096950
5	0.5987	0.8473	1.0023	95.65	187.75	3.45	-0.087609
6	0.7575	0.8992	0.8635	109.29	197.50	3.30	-0.054378
7	0.8493	0.9339	0.8019	119.09	204.29	3.21	-0.032863
8	0.9075	0.9601	0.8716	125.91	209.50	3.15	-0.019996
9	0.9499	0.9778	0.8731	131.15	212.36	3.10	-0.010665
10	0.9779	0.0000	0.0000	134.02	0.00	2.83	-0.009221

REFLUX	ERROR	FEED	FEED CONC.
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134.02	-0.2047	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	203.89	218.73	7709.41	114376.18
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TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0146	0.1337	1.0907	71.86	123.86	14.93	-0.007519
2	0.0894	0.3431	0.8665	195.73	135.84	3.84	-0.037437
3	0.2282	0.5996	0.8361	207.73	155.10	3.76	-0.085858
4	0.4117	0.7614	0.9163	227.04	173.70	3.62	-0.077818
5	0.5917	0.8445	0.9979	95.21	187.30	3.46	-0.087789
6	0.7530	0.8974	0.8628	108.89	197.20	3.30	-0.062545
7	0.8467	0.9328	0.8005	118.85	204.06	3.21	-0.034531
8	0.9059	0.9594	0.8710	125.75	209.25	3.15	-0.024496
9	0.9490	0.9776	0.8847	130.96	212.47	3.10	-0.016245
10	0.9776	0.0000	0.0000	134.20	0.00	2.83	-0.002681

REFLUX	ERROR	FEED	FEED CONC.
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134.20	-0.0194	150.50	0.5060
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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118.50	204.03	218.86	7709.41	114376.18
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TIME = 82.00

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.2966	1.1275	74.21	125.65	14.88	0.000004
2	0.2004	0.5682	0.8607	199.86	144.00	3.77	0.000011
3	0.3877	0.7400	0.7939	218.21	161.89	3.64	0.000008
4	0.5192	0.8145	0.9692	236.10	172.61	3.52	0.000002
5	0.6826	0.8726	0.8903	96.52	182.71	3.37	0.000001
6	0.7947	0.9193	1.0322	106.62	191.85	3.26	0.000000
7	0.8783	0.9462	0.7891	115.76	197.16	3.18	-0.000001
8	0.9238	0.9659	0.8030	121.07	201.02	3.13	-0.000001
9	0.9561	0.9818	0.9873	124.93	204.10	3.09	-0.000001
10	0.9818	0.0000	0.0000	128.01	0.00	2.83	-0.000001

REFLUX	ERROR	FEED	FEED CONC.
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128.01	-0.0194	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.27	216.78	6437.43	106273.27
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0765	0.4307	1.1141	99.62	118.25	14.80	0.472559
2	0.3019	0.6928	0.9031	216.85	138.91	3.71	1.018494
3	0.4829	0.7949	0.8365	236.72	150.39	3.56	0.745789
4	0.5654	0.8360	1.0133	247.55	156.79	3.48	0.373240
5	0.7270	0.8886	0.8820	103.30	165.45	3.33	0.409636
6	0.8257	0.9257	0.8482	111.56	172.09	3.23	0.301057
7	0.8915	0.9533	0.8582	117.89	177.32	3.16	0.124982
8	0.9360	0.9703	0.7523	122.98	180.45	3.11	0.114197
9	0.9636	0.9819	0.7063	126.00	182.48	3.09	0.061549
10	0.9818	0.0000	0.0000	127.95	0.00	2.83	0.006533

REFLUX	ERROR	FEED	FEED CONC.
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127.95	-0.0033	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	194.61	209.21	6437.43	93990.61
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20.0 = 3411

TIME = 3.00

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1074	0.4981	1.1034	88.90	123.19	14.74	0.260388
2	0.3531	0.7325	0.9244	211.50	143.89	3.67	0.362924
3	0.5172	0.8114	0.8519	231.92	153.48	3.53	0.217133
4	0.5792	0.8416	1.0252	241.30	158.57	3.47	0.065115
5	0.7431	0.8945	0.8803	96.03	167.57	3.31	0.057932
6	0.8378	0.9299	0.8184	104.98	174.12	3.22	0.047752
7	0.8978	0.9559	0.8593	111.47	179.25	3.16	0.033358
8	0.9402	0.9722	0.7523	116.57	182.39	3.11	0.020234
9	0.9659	0.9831	0.7063	119.69	184.37	3.08	0.012387
10	0.9828	0.0000	0.0000	121.66	0.00	2.83	0.017784

REFLUX	ERROR	FEED	FEED CONC.
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121.66	-1.0058	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	190.64	205.28	6437.43	94240.94
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1225	0.5247	1.0982	83.95	125.38	14.70	0.109291
2	0.3714	0.7434	0.9321	209.08	145.45	3.65	0.102620
3	0.5253	0.8153	0.8555	229.07	154.34	3.52	0.025534
4	0.5805	0.8421	1.0252	237.93	158.91	3.47	-0.015111
5	0.7434	0.8946	0.8803	92.22	167.87	3.31	-0.032772
6	0.8382	0.9300	0.8184	101.21	174.44	3.22	-0.026614
7	0.8981	0.9561	0.8593	107.80	179.59	3.16	-0.018378
8	0.9405	0.9723	0.7523	112.98	182.74	3.11	-0.010107
9	0.9662	0.9832	0.7063	116.13	184.74	3.08	-0.004265
10	0.9832	0.0000	0.0000	118.14	0.00	2.83	0.000363

REFLUX	ERROR	FEED	FEED CONC.
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118.14	-1.3944	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.74	203.40	6437.43	94360.61
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TABLE 4-17 CLOSED LOOP - STEAM IN STEAM-HEAT UNIT - CONT.

TIME = 10.1

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT-UP	DERIVATIVE
1	0.01074	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.03531	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.05115	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.05795	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.07431	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.08318	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.08918	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.09418	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.09629	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.09828	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	151.66	-1.0057	150.30	0.5156		
FEED						
FEED CONC.						
STEAM FLOW	96.70	190.64	197.54	6437.43		
TEMPERATURE						
COEFFICIENT						

TIME = 15.10

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT-UP	DERIVATIVE
1	0.01188	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.03714	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.05228	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.05807	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.07434	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.08318	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.08918	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.09418	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.09629	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.09828	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	118.14	-1.3944	120.30	0.5156		
FEED						
FEED CONC.						
STEAM FLOW	96.70	190.64	197.54	6437.43		
TEMPERATURE						
COEFFICIENT						

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1275	0.5329	1.0965	81.80	126.06	14.69	0.024226
2	0.3751	0.7457	0.9336	207.80	145.75	3.65	0.005797
3	0.5252	0.8154	0.8555	227.49	154.35	3.52	-0.016465
4	0.5786	0.8414	1.0252	236.10	158.75	3.47	-0.024672
5	0.7398	0.8933	0.8803	90.23	167.54	3.32	-0.045330
6	0.8351	0.9287	0.8184	99.06	174.06	3.22	-0.041378
7	0.8958	0.9551	0.8593	105.63	179.20	3.16	-0.032282
8	0.9391	0.9716	0.7523	110.80	182.38	3.11	-0.020824
9	0.9654	0.9828	0.7063	114.00	184.40	3.08	-0.011715
10	0.9829	0.0000	0.0000	116.03	0.00	2.83	-0.009773

REFLUX	ERROR	FEED	FEED CONC.
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116.03	-1.1564	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.10	202.77	6437.43	94400.78
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1281	0.5337	1.0963	81.40	126.12	14.69	-0.002414
2	0.3745	0.7453	0.9334	207.52	145.68	3.65	-0.013859
3	0.5237	0.8148	0.8548	227.09	154.20	3.52	-0.016066
4	0.5769	0.8407	1.0243	235.63	158.56	3.47	-0.014245
5	0.7366	0.8921	0.8803	89.70	167.21	3.32	-0.030734
6	0.8320	0.9274	0.8184	98.38	173.66	3.22	-0.030205
7	0.8933	0.9540	0.8593	104.86	178.76	3.16	-0.025391
8	0.9374	0.9709	0.7523	109.99	181.94	3.11	-0.017843
9	0.9644	0.9823	0.7063	113.18	183.97	3.09	-0.011052
10	0.9825	0.0000	0.0000	115.23	0.00	2.83	-0.011320

REFLUX	ERROR	FEED	FEED CONC.
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115.23	-0.6682	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.02	202.69	6437.43	94405.69
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TABLE 0-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - 0.01

TIME = 20.01

PLATE	CONCX	CONCV	EFFICI	LIQID	VAPOR	HEAT LOAD
10	0.9857	0.0000	0.0000	116.03	116.03	2.88 - 0.00473
9	0.9654	0.0000	0.0000	114.00	184.40	1.00 - 0.01112
8	0.9391	0.0000	0.0000	112.53	113.11	1.11 - 0.01848
7	0.8959	0.0000	0.0000	109.03	109.03	1.10 - 0.03252
6	0.8351	0.0000	0.0000	107.00	107.00	1.22 - 0.04233
5	0.7898	0.0000	0.0000	105.23	105.23	1.32 - 0.04533
4	0.7186	0.0000	0.0000	103.00	103.00	1.47 - 0.04848
3	0.6252	0.0000	0.0000	100.00	100.00	1.52 - 0.05058
2	0.5184	0.0000	0.0000	97.00	97.00	1.55 - 0.05058
1	0.3751	0.0000	0.0000	94.00	94.00	1.57 - 0.05058
REFLX	ERRR	FEED	FEED CONC.			
116.03	-1.1264	116.34	0.2126			
STEAM	TEMPERATURE					
FLW	REFLX	STEAM	COEFFICIENT			
96.70	188.10	202.77	6437.43			96.70

TIME = 25.01

PLATE	CONCX	CONCV	EFFICI	LIQID	VAPOR	HEAT LOAD
10	0.9852	0.0000	0.0000	112.53	113.11	2.88 - 0.01135
9	0.9654	0.0000	0.0000	110.00	184.40	1.11 - 0.01848
8	0.9391	0.0000	0.0000	107.00	107.00	1.10 - 0.03252
7	0.8959	0.0000	0.0000	105.23	105.23	1.22 - 0.04233
6	0.8351	0.0000	0.0000	103.00	103.00	1.32 - 0.04533
5	0.7898	0.0000	0.0000	101.00	101.00	1.47 - 0.04848
4	0.7186	0.0000	0.0000	98.00	98.00	1.52 - 0.05058
3	0.6252	0.0000	0.0000	95.00	95.00	1.55 - 0.05058
2	0.5184	0.0000	0.0000	92.00	92.00	1.57 - 0.05058
1	0.3751	0.0000	0.0000	89.00	89.00	1.59 - 0.05058
REFLX	ERRR	FEED	FEED CONC.			
112.53	-1.1264	116.34	0.2126			
STEAM	TEMPERATURE					
FLW	REFLX	STEAM	COEFFICIENT			
96.70	188.10	202.77	6437.43			96.70

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1279	0.5332	1.0964	81.76	126.07	14.69	-0.001413
2	0.3736	0.7449	0.9330	207.84	145.60	3.65	-0.003568
3	0.5229	0.8144	0.8544	227.37	154.12	3.52	-0.004094
4	0.5762	0.8404	1.0236	235.89	158.47	3.47	-0.003158
5	0.7348	0.8915	0.8805	89.95	167.04	3.32	-0.012512
6	0.8301	0.9268	0.8216	98.52	173.45	3.23	-0.015697
7	0.8917	0.9534	0.8592	104.95	178.50	3.16	-0.010439
8	0.9362	0.9704	0.7523	110.02	181.67	3.11	-0.009360
9	0.9637	0.9819	0.7063	113.19	183.69	3.09	-0.006623
10	0.9821	0.0000	0.0000	115.22	0.00	2.83	-0.007939

REFLUX	ERROR	FEED	FEED CONC.
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115.22	-0.2341	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.06	202.72	6437.43	94403.62
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1279	0.5333	1.0963	81.85	126.08	14.69	-0.000967
2	0.3737	0.7449	0.9330	207.93	145.60	3.65	-0.003611
3	0.5228	0.8144	0.8544	227.46	154.11	3.52	-0.003964
4	0.5761	0.8404	1.0235	235.97	158.46	3.47	-0.004716
5	0.7342	0.8913	0.8806	90.02	166.98	3.32	-0.008666
6	0.8293	0.9266	0.8265	98.55	173.39	3.23	-0.008955
7	0.8912	0.9531	0.8564	104.97	178.41	3.16	-0.005970
8	0.9356	0.9702	0.7539	109.99	181.56	3.12	-0.006889
9	0.9633	0.9818	0.7135	113.15	183.59	3.09	-0.005332
10	0.9819	0.0000	0.0000	115.19	0.00	2.83	-0.001229

REFLUX	ERROR	FEED	FEED CONC.
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115.19	-0.0171	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.05	202.71	6437.43	94404.05
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TABLE 0-17 CLOSED LOOP - ST-9 IN STEAM FLOW RATE - 1

TIME = 30.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	LIQ -	HEAT LOAD
1	0.1237	0.2333	11.76	126.03	14.04	-0.001418
2	0.3713	0.7449	12.17	126.15	14.04	-0.003268
3	0.5258	0.8144	12.37	126.15	14.04	-0.003268
4	0.5258	0.8144	12.37	126.15	14.04	-0.003268
5	0.7345	0.8805	12.37	126.15	14.04	-0.003268
6	0.8201	0.9258	12.37	126.15	14.04	-0.003268
7	0.8201	0.9258	12.37	126.15	14.04	-0.003268
8	0.9365	0.9704	12.37	126.15	14.04	-0.003268
9	0.9365	0.9704	12.37	126.15	14.04	-0.003268
10	0.9365	0.9704	12.37	126.15	14.04	-0.003268
REFLUX	112.22	-0.2341	12.37	126.15	14.04	-0.003268
FEED						
ERROR						
FEED CONC.						
STEAM FLOW	96.10	188.06	502.15			
TEMPERATURE						
RECYCLER						
COEFFICIENT						
HEAT LOAD						

TIME = 31.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	LIQ -	HEAT LOAD
1	0.1237	0.2333	11.76	126.03	14.04	-0.001418
2	0.3713	0.7449	12.17	126.15	14.04	-0.003268
3	0.5258	0.8144	12.37	126.15	14.04	-0.003268
4	0.5258	0.8144	12.37	126.15	14.04	-0.003268
5	0.7345	0.8805	12.37	126.15	14.04	-0.003268
6	0.8201	0.9258	12.37	126.15	14.04	-0.003268
7	0.8201	0.9258	12.37	126.15	14.04	-0.003268
8	0.9365	0.9704	12.37	126.15	14.04	-0.003268
9	0.9365	0.9704	12.37	126.15	14.04	-0.003268
10	0.9365	0.9704	12.37	126.15	14.04	-0.003268
REFLUX	112.19	-0.0171	12.37	126.15	14.04	-0.003268
FEED						
ERROR						
FEED CONC.						
STEAM FLOW	96.70	188.02	502.11			
TEMPERATURE						
RECYCLER						
COEFFICIENT						
HEAT LOAD						

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1278	0.5330	1.0964	81.89	126.05	14.69	-0.001670
2	0.3733	0.7447	0.9329	207.95	145.57	3.65	-0.003026
3	0.5224	0.8142	0.8542	227.47	154.08	3.52	-0.002530
4	0.5758	0.8402	1.0232	235.98	158.42	3.47	-0.001783
5	0.7335	0.8911	0.8808	90.02	166.92	3.32	-0.005230
6	0.8286	0.9265	0.8305	98.52	173.33	3.23	-0.006070
7	0.8908	0.9529	0.8542	104.95	178.32	3.16	-0.003968
8	0.9351	0.9700	0.7560	109.93	181.46	3.12	-0.004658
9	0.9629	0.9818	0.7276	113.09	183.52	3.09	-0.003242
10	0.9818	0.0000	0.0000	115.14	0.00	2.83	-0.000043

REFLUX	ERROR	FEED	FEED CONC.
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115.14	-0.0006	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.07	202.74	6437.43	94402.71
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1277	0.5329	1.0964	82.03	126.05	14.69	0.000560
2	0.3732	0.7446	0.9328	208.08	145.56	3.65	0.000979
3	0.5223	0.8142	0.8542	227.59	154.07	3.52	0.000467
4	0.5757	0.8402	1.0231	236.10	158.41	3.47	0.000291
5	0.7333	0.8910	0.8808	90.14	166.90	3.32	-0.001192
6	0.8283	0.9264	0.8325	98.63	173.31	3.23	-0.002027
7	0.8905	0.9528	0.8530	105.04	178.28	3.16	-0.001575
8	0.9349	0.9699	0.7571	110.01	181.42	3.12	-0.002004
9	0.9627	0.9818	0.7349	113.16	183.48	3.09	-0.001419
10	0.9818	0.0000	0.0000	115.22	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.22	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.08	202.74	6437.43	94402.35
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TABLE 8-17 CLOSED LOOP - STEP IN STEAM FLOW

TIME = 40.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR

10	0.0000	0.0000	112.14	112.14	5.83	-0.00043
9	0.0000	0.0000	112.14	112.14	5.83	-0.00043
8	0.0000	0.0000	112.14	112.14	5.83	-0.00043
7	0.0000	0.0000	112.14	112.14	5.83	-0.00043
6	0.0000	0.0000	112.14	112.14	5.83	-0.00043
5	0.0000	0.0000	112.14	112.14	5.83	-0.00043
4	0.0000	0.0000	112.14	112.14	5.83	-0.00043
3	0.0000	0.0000	112.14	112.14	5.83	-0.00043
2	0.0000	0.0000	112.14	112.14	5.83	-0.00043
1	0.0000	0.0000	112.14	112.14	5.83	-0.00043

REFLUX FEED FEED CONC.

112.14 - 0.0000 120.30 0.2120

STEAM REBOILER TEMPERATURE
FLW STEAM

96.70 118.07 202.74 8437.43 9440.71

TIME = 40.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR

10	0.0000	0.0000	112.14	112.14	5.83	-0.00043
9	0.0000	0.0000	112.14	112.14	5.83	-0.00043
8	0.0000	0.0000	112.14	112.14	5.83	-0.00043
7	0.0000	0.0000	112.14	112.14	5.83	-0.00043
6	0.0000	0.0000	112.14	112.14	5.83	-0.00043
5	0.0000	0.0000	112.14	112.14	5.83	-0.00043
4	0.0000	0.0000	112.14	112.14	5.83	-0.00043
3	0.0000	0.0000	112.14	112.14	5.83	-0.00043
2	0.0000	0.0000	112.14	112.14	5.83	-0.00043
1	0.0000	0.0000	112.14	112.14	5.83	-0.00043

REFLUX FEED FEED CONC.

112.14 - 0.0000 120.30 0.2120

STEAM REBOILER TEMPERATURE
FLW STEAM

96.70 118.08 202.74 8437.43 9440.71

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1278	0.5331	1.0964	82.14	126.06	14.69	0.002273
2	0.3734	0.7448	0.9329	208.19	145.58	3.65	0.003504
3	0.5224	0.8143	0.8542	227.71	154.08	3.52	0.002093
4	0.5758	0.8403	1.0232	236.21	158.42	3.47	0.001313
5	0.7333	0.8910	0.8808	90.25	166.90	3.32	0.001008
6	0.8282	0.9264	0.8328	98.73	173.31	3.23	0.000335
7	0.8905	0.9528	0.8526	105.14	178.27	3.16	-0.000116
8	0.9348	0.9698	0.7575	110.10	181.41	3.12	-0.000364
9	0.9626	0.9818	0.7375	113.24	183.48	3.09	-0.000310
10	0.9818	0.0000	0.0000	115.31	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.31	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.06	202.73	6437.43	94403.32
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1281	0.5335	1.0963	82.21	126.10	14.69	0.003384
2	0.3738	0.7450	0.9331	208.30	145.61	3.65	0.005050
3	0.5227	0.8144	0.8543	227.81	154.11	3.52	0.003035
4	0.5760	0.8403	1.0233	236.31	158.44	3.47	0.001878
5	0.7334	0.8910	0.8808	90.34	166.93	3.32	0.002214
6	0.8283	0.9264	0.8323	98.82	173.33	3.23	0.001656
7	0.8905	0.9528	0.8528	105.23	178.29	3.16	0.000722
8	0.9348	0.9699	0.7575	110.19	181.43	3.12	0.000590
9	0.9626	0.9818	0.7374	113.32	183.50	3.09	0.000338
10	0.9818	0.0000	0.0000	115.39	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.39	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	188.03	202.70	6437.43	94405.23
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TABLE 0-1 CLOSED LOOP - 100% FLOW - 100% FLOW - 100% FLOW

TIME = 20.00

PLATE	CONC	CONV EFFICI	LIQUID	VAPOR	HEAT LOAD	COEFFICIENT	TEMPERATURE	REFLUX	FEED	ERROR	FEED CONC.
10	0.9810	0.0000	112.31	0.00	2.83	0.00000	112.31	112.31	120.3	0.000	0.2128
9	0.9810	0.0000	113.34	183.43	3.09	0.00038	113.34	113.34	120.3	0.000	0.2128
8	0.9810	0.0000	110.19	181.43	2.12	0.00020	110.19	110.19	120.3	0.000	0.2128
7	0.9810	0.0000	102.74	178.29	1.16	0.00122	102.74	102.74	120.3	0.000	0.2128
6	0.9810	0.0000	90.34	166.93	1.32	0.00162	90.34	90.34	120.3	0.000	0.2128
5	0.9810	0.0000	82.51	154.11	1.32	0.00302	82.51	82.51	120.3	0.000	0.2128
4	0.9810	0.0000	52.74	128.44	1.47	0.01878	52.74	52.74	120.3	0.000	0.2128
3	0.9810	0.0000	22.74	124.11	1.32	0.00302	22.74	22.74	120.3	0.000	0.2128
2	0.9810	0.0000	12.34	124.11	1.32	0.00302	12.34	12.34	120.3	0.000	0.2128
1	0.9810	0.0000	2.34	124.11	1.32	0.00302	2.34	2.34	120.3	0.000	0.2128

TIME = 25.00

PLATE	CONC	CONV EFFICI	LIQUID	VAPOR	HEAT LOAD	COEFFICIENT	TEMPERATURE	REFLUX	FEED	ERROR	FEED CONC.
10	0.9810	0.0000	112.31	0.00	2.83	0.00000	112.31	112.31	120.3	0.000	0.2128
9	0.9810	0.0000	113.34	183.43	3.09	0.00038	113.34	113.34	120.3	0.000	0.2128
8	0.9810	0.0000	110.19	181.43	2.12	0.00020	110.19	110.19	120.3	0.000	0.2128
7	0.9810	0.0000	102.74	178.29	1.16	0.00122	102.74	102.74	120.3	0.000	0.2128
6	0.9810	0.0000	90.34	166.93	1.32	0.00162	90.34	90.34	120.3	0.000	0.2128
5	0.9810	0.0000	82.51	154.11	1.32	0.00302	82.51	82.51	120.3	0.000	0.2128
4	0.9810	0.0000	52.74	128.44	1.47	0.01878	52.74	52.74	120.3	0.000	0.2128
3	0.9810	0.0000	22.74	124.11	1.32	0.00302	22.74	22.74	120.3	0.000	0.2128
2	0.9810	0.0000	12.34	124.11	1.32	0.00302	12.34	12.34	120.3	0.000	0.2128
1	0.9810	0.0000	2.34	124.11	1.32	0.00302	2.34	2.34	120.3	0.000	0.2128

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1284	0.5341	1.0962	82.28	126.14	14.69	0.004080
2	0.3742	0.7452	0.9333	208.41	145.65	3.65	0.005995
3	0.5229	0.8145	0.8544	227.92	154.14	3.52	0.003594
4	0.5761	0.8404	1.0235	236.40	158.47	3.47	0.002200
5	0.7336	0.8911	0.8807	90.43	166.96	3.32	0.002890
6	0.8285	0.9265	0.8313	98.91	173.36	3.23	0.002397
7	0.8906	0.9528	0.8532	105.31	178.32	3.16	0.001198
8	0.9349	0.9699	0.7572	110.27	181.46	3.12	0.001133
9	0.9627	0.9818	0.7356	113.41	183.53	3.09	0.000710
10	0.9818	0.0000	0.0000	115.47	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.47	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.99	202.66	6437.43	94407.73
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1287	0.5347	1.0961	82.33	126.20	14.69	0.004513
2	0.3747	0.7455	0.9335	208.52	145.70	3.65	0.006574
3	0.5233	0.8146	0.8546	228.02	154.17	3.52	0.003925
4	0.5763	0.8405	1.0237	236.48	158.50	3.47	0.002387
5	0.7339	0.8912	0.8807	90.51	166.99	3.32	0.003268
6	0.8287	0.9265	0.8300	99.00	173.39	3.23	0.002812
7	0.8907	0.9529	0.8538	105.40	178.36	3.16	0.001465
8	0.9350	0.9699	0.7567	110.36	181.50	3.12	0.001440
9	0.9628	0.9818	0.7330	113.50	183.56	3.09	0.000917
10	0.9818	0.0000	0.0000	115.56	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.56	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.95	202.61	6437.43	94410.58
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TABLE 11-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	L - P	DERIVATIVE
1	0.1524	1.0961	1.0961	85.33	156.50	17.00	0.004513
2	0.3744	0.9335	0.9335	508.55	145.70	3.95	0.006544
3	0.5233	0.8146	0.8146	154.15	154.15	3.55	0.003958
4	0.8146	0.8405	1.0237	536.48	150.00	3.47	0.003987
5	0.8405	0.8807	0.8807	0.51	166.99	3.35	0.003568
6	0.8807	0.9265	0.9265	29.00	173.35	3.3	0.02815
7	0.9265	0.9529	0.9529	105.40	170.40	3.16	0.01440
8	0.9529	0.9567	0.9567	110.36	181.10	3.15	0.001440
9	0.9567	0.9818	0.9818	113.50	183.50	3.09	0.000915
10	0.9818	0.0000	0.0000	115.50	0.00	2.88	0.000001

REFLUX 115.47
 ERROR 0.0000
 FEED 100.10
 FEED CONC. 0.2150

STEAM FLOW 96.70
 REBOILER STEAM 187.99
 TEMPERATURE 100.00
 COEFFICIENT 6437.43
 HEAT LOAD 4441.13

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	L - P	DERIVATIVE
1	0.1524	1.0961	1.0961	85.33	156.50	17.00	0.004513
2	0.3744	0.9335	0.9335	508.55	145.70	3.95	0.006544
3	0.5233	0.8146	0.8146	154.15	154.15	3.55	0.003958
4	0.8146	0.8405	1.0237	536.48	150.00	3.47	0.003987
5	0.8405	0.8807	0.8807	0.51	166.99	3.35	0.003568
6	0.8807	0.9265	0.9265	29.00	173.35	3.3	0.02815
7	0.9265	0.9529	0.9529	105.40	170.40	3.16	0.01440
8	0.9529	0.9567	0.9567	110.36	181.10	3.15	0.001440
9	0.9567	0.9818	0.9818	113.50	183.50	3.09	0.000915
10	0.9818	0.0000	0.0000	115.50	0.00	2.88	0.000001

REFLUX 115.56
 ERROR 0.0000
 FEED 100.10
 FEED CONC. 0.2150

STEAM FLOW 96.70
 REBOILER STEAM 187.92
 TEMPERATURE 100.00
 COEFFICIENT 6437.43
 HEAT LOAD 4441.13

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1291	0.5354	1.0959	82.38	126.25	14.69	0.004780
2	0.3753	0.7459	0.9337	208.62	145.75	3.65	0.006931
3	0.5236	0.8148	0.8547	228.11	154.21	3.52	0.004121
4	0.5765	0.8405	1.0239	236.57	158.53	3.47	0.002495
5	0.7342	0.8913	0.8806	90.59	167.03	3.32	0.003479
6	0.8290	0.9266	0.8285	99.09	173.43	3.23	0.003041
7	0.8908	0.9529	0.8545	105.48	178.40	3.16	0.001613
8	0.9351	0.9700	0.7562	110.45	181.54	3.12	0.001607
9	0.9628	0.9818	0.7299	113.59	183.59	3.09	0.001032
10	0.9818	0.0000	0.0000	115.64	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.64	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.90	202.56	6437.43	94413.68
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1295	0.5361	1.0958	82.43	126.31	14.69	0.004934
2	0.3759	0.7462	0.9340	208.73	145.80	3.65	0.007125
3	0.5239	0.8149	0.8549	228.21	154.24	3.52	0.004228
4	0.5767	0.8406	1.0241	236.65	158.56	3.47	0.002548
5	0.7345	0.8914	0.8806	90.66	167.07	3.32	0.003585
6	0.8292	0.9266	0.8270	99.17	173.46	3.23	0.003159
7	0.8909	0.9530	0.8552	105.56	178.45	3.16	0.001688
8	0.9352	0.9700	0.7556	110.54	181.59	3.12	0.001696
9	0.9629	0.9818	0.7265	113.68	183.63	3.09	0.001092
10	0.9818	0.0000	0.0000	115.72	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.72	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.85	202.51	6437.43	94416.89
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TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE

PLATE	CONV	EFFICI	LIQUID	VAPOR	LI-UP	DERIVATIVE
1	0.1291	0.2324	1.0229	1.0229	1.0000	0.0000
2	0.3722	0.7429	0.9331	1.0229	1.0000	0.0000
3	0.5239	0.8148	0.8241	1.0229	1.0000	0.0000
4	0.5167	0.8406	1.0241	1.0229	1.0000	0.0000
5	0.4744	0.8914	0.8806	1.0229	1.0000	0.0000
6	0.8222	0.9266	0.8270	1.0229	1.0000	0.0000
7	0.8209	0.9719	0.8222	1.0229	1.0000	0.0000
8	0.9322	0.9700	0.7526	1.0229	1.0000	0.0000
9	0.9629	0.9718	0.7262	1.0229	1.0000	0.0000
10	0.9818	0.9700	0.0000	1.0229	1.0000	0.0000
REFLUX	112.64	0.2126	120.30	0.2126		
FLW	96.70	187.90	202.20	6437.43		
STEAM		TEMPERATURE				
REBOILER		COEFFICIENT				
HEAT LOAD						

TIME = 75.00

PLATE	CONV	EFFICI	LIQUID	VAPOR	LI-UP	DERIVATIVE
1	0.1291	0.2324	1.0229	1.0229	1.0000	0.0000
2	0.3722	0.7429	0.9331	1.0229	1.0000	0.0000
3	0.5239	0.8148	0.8241	1.0229	1.0000	0.0000
4	0.5167	0.8406	1.0241	1.0229	1.0000	0.0000
5	0.4744	0.8914	0.8806	1.0229	1.0000	0.0000
6	0.8222	0.9266	0.8270	1.0229	1.0000	0.0000
7	0.8209	0.9719	0.8222	1.0229	1.0000	0.0000
8	0.9322	0.9700	0.7526	1.0229	1.0000	0.0000
9	0.9629	0.9718	0.7262	1.0229	1.0000	0.0000
10	0.9818	0.9700	0.0000	1.0229	1.0000	0.0000
REFLUX	117.72	0.2126	120.30	0.2126		
FLW	96.70	187.90	202.20	6437.43		
STEAM		TEMPERATURE				
REBOILER		COEFFICIENT				
HEAT LOAD						

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 80.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1300	0.5368	1.0956	82.47	126.37	14.69	0.005022
2	0.3765	0.7465	0.9342	208.83	145.85	3.65	0.007232
3	0.5243	0.8151	0.8550	228.31	154.28	3.52	0.004284
4	0.5769	0.8407	1.0243	236.73	158.59	3.47	0.002574
5	0.7348	0.8915	0.8805	90.74	167.11	3.32	0.003636
6	0.8295	0.9267	0.8254	99.26	173.50	3.23	0.003216
7	0.8911	0.9531	0.8559	105.64	178.49	3.16	0.001724
8	0.9354	0.9701	0.7550	110.63	181.63	3.12	0.001738
9	0.9630	0.9818	0.7229	113.77	183.67	3.09	0.001122
10	0.9818	0.0000	0.0000	115.80	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.80	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.79	202.46	6437.43	94420.20
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TIME = 85.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1304	0.5375	1.0955	82.51	126.43	14.69	0.005064
2	0.3771	0.7469	0.9345	208.93	145.91	3.65	0.007285
3	0.5247	0.8152	0.8552	228.40	154.32	3.52	0.004308
4	0.5772	0.8408	1.0245	236.81	158.63	3.47	0.002578
5	0.7351	0.8916	0.8805	90.81	167.16	3.32	0.003652
6	0.8298	0.9267	0.8238	99.34	173.53	3.23	0.003236
7	0.8912	0.9532	0.8567	105.72	178.54	3.16	0.001740
8	0.9355	0.9701	0.7544	110.72	181.68	3.12	0.001755
9	0.9631	0.9818	0.7193	113.85	183.71	3.09	0.001133
10	0.9818	0.0000	0.0000	115.89	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.89	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.74	202.41	6437.43	94423.55
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TABLE 0-17 CLOSED LOOP - STEP IN STEAM FLOW RATE -

TIME = 80.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	LO	DERIV
1	0.1388	0.7778	0.7778	0.7778	14.50	0.00000
2	0.3778	0.7778	0.7778	0.7778	14.50	0.00000
3	0.5248	0.8121	0.8121	0.8121	14.50	0.00000
4	0.5248	0.8407	0.8407	0.8407	14.50	0.00000
5	0.7348	0.8802	0.8802	0.8802	14.50	0.00000
6	0.7348	0.8802	0.8802	0.8802	14.50	0.00000
7	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
8	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
9	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
10	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
REFLUX	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
ERROR	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
FEED CONC.	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
STEAM	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
REBOILER	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	120.30	0.0000	0.0000	0.0000	0.0000

TIME = 85.00

PLATE	CONC	EFFICI	LIQUID	VAPOR	LO	DERIV
1	0.1388	0.7778	0.7778	0.7778	14.50	0.00000
2	0.3778	0.7778	0.7778	0.7778	14.50	0.00000
3	0.5248	0.8121	0.8121	0.8121	14.50	0.00000
4	0.5248	0.8407	0.8407	0.8407	14.50	0.00000
5	0.7348	0.8802	0.8802	0.8802	14.50	0.00000
6	0.7348	0.8802	0.8802	0.8802	14.50	0.00000
7	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
8	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
9	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
10	0.8811	0.8811	0.8811	0.8811	14.50	0.00000
REFLUX	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
FEED	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
ERROR	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
FEED CONC.	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
STEAM	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
REBOILER	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
TEMPERATURE	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
COEFFICIENT	0.0000	120.30	0.0000	0.0000	0.0000	0.0000
HEAT LOAD	0.0000	120.30	0.0000	0.0000	0.0000	0.0000

TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 1

TIME = 90.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1308	0.5382	1.0954	82.55	126.50	14.68	0.005083
2	0.3777	0.7472	0.9347	209.04	145.96	3.65	0.007301
3	0.5250	0.8154	0.8554	228.50	154.36	3.52	0.004313
4	0.5774	0.8409	1.0247	236.89	158.66	3.47	0.002581
5	0.7354	0.8917	0.8804	90.89	167.20	3.32	0.003654
6	0.8300	0.9268	0.8222	99.42	173.57	3.23	0.003237
7	0.8914	0.9532	0.8574	105.79	178.58	3.16	0.001743
8	0.9357	0.9702	0.7538	110.80	181.72	3.12	0.001757
9	0.9632	0.9818	0.7157	113.94	183.75	3.09	0.001137
10	0.9818	0.0000	0.0000	115.97	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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115.97	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.69	202.35	6437.43	94426.92
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TIME = 95.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1312	0.5390	1.0952	82.59	126.56	14.68	0.005067
2	0.3783	0.7476	0.9350	209.14	146.02	3.65	0.007255
3	0.5254	0.8156	0.8555	228.59	154.40	3.52	0.004271
4	0.5776	0.8410	1.0249	236.97	158.69	3.47	0.002668
5	0.7357	0.8918	0.8804	90.96	167.24	3.32	0.003685
6	0.8303	0.9268	0.8206	99.51	173.61	3.23	0.003241
7	0.8915	0.9533	0.8582	105.87	178.63	3.16	0.001741
8	0.9358	0.9702	0.7532	110.89	181.77	3.12	0.001752
9	0.9633	0.9818	0.7121	114.03	183.79	3.09	0.001134
10	0.9818	0.0000	0.0000	116.05	0.00	2.83	0.000001

REFLUX	ERROR	FEED	FEED CONC.
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116.05	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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96.70	187.63	202.30	6437.43	94430.28
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TABLE U-17 CLOSED LOOP - STEP IN STEAM FLOW RATE - 10%

PLATE CONCX CONCV EFFICI LIQUID VAPOR HTL - 10% DEVIATIVE

10	0.0000	0.0000	115.93	113.94	183.12	0.0000	0.0000
9	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
8	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
7	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
6	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
5	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
4	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
3	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
2	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
1	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000

REFLUX FEED FEED CONC.

115.93 0.0000 120.30 0.7157

STEAM RECYCLER TEMPERATURE COEFFICIENT HEAT LOSS

96.70 181.63 505.32 937.43

TIME = 92.00

PLATE CONCX CONCV EFFICI LIQUID VAPOR HTL - 10% DEVIATIVE

10	0.0000	0.0000	115.93	113.94	183.12	0.0000	0.0000
9	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
8	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
7	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
6	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
5	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
4	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
3	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
2	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000
1	0.0000	0.0000	0.7157	113.94	183.12	0.0000	0.0000

REFLUX FEED FEED CONC.

115.93 0.0000 120.30 0.7157

STEAM RECYCLER TEMPERATURE COEFFICIENT HEAT LOSS

96.70 181.63 505.32 937.43

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0827	0.4575	1.1422	77.93	125.74	14.79	0.000005
2	0.3141	0.6849	0.7897	203.67	144.43	3.70	0.000008
3	0.4739	0.7948	0.9196	222.37	156.73	3.56	0.000005
4	0.5583	0.8287	0.9272	234.66	161.79	3.49	0.000003
5	0.7047	0.8831	0.9434	89.42	170.75	3.35	0.000001
6	0.8105	0.9220	0.9221	98.38	177.73	3.25	0.000000
7	0.8810	0.9484	0.8333	105.36	182.54	3.17	0.000000
8	0.9265	0.9674	0.8243	110.18	185.93	3.13	-0.000001
9	0.9582	0.9818	0.9070	113.57	188.38	3.09	0.000000
10	0.9818	0.0000	0.0000	116.01	0.00	2.83	-0.000000

REFLUX	ERROR	FEED	FEED CONC.
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116.01	0.0000	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.30	193.76	209.12	6411.37	98423.05
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0558	0.3794	1.1442	65.94	130.95	14.85	-0.214343
2	0.2544	0.6301	0.8231	197.34	150.34	3.74	-0.471865
3	0.4311	0.7686	0.8342	217.08	165.82	3.60	-0.368751
4	0.5372	0.8211	0.9469	232.87	173.63	3.51	-0.173137
5	0.6870	0.8748	0.8997	90.54	182.93	3.37	-0.114289
6	0.7941	0.9183	1.0064	99.95	191.28	3.26	-0.109788
7	0.8737	0.9438	0.7645	108.41	196.06	3.18	-0.045340
8	0.9183	0.9648	0.8714	113.24	200.04	3.13	-0.033961
9	0.9541	0.9810	0.9886	117.25	202.92	3.10	-0.020012
10	0.9813	0.0000	0.0000	120.15	0.00	2.83	-0.022239

REFLUX	ERROR	FEED	FEED CONC.
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120.15	0.5196	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	197.61	214.22	6411.37	106503.62
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TABLE U-18 CLOSED LOOP - RISE IN STEAM TEMPERATURE - 1000°F

TIME = 0.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HEAT LOAD
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	100.00	100.00	0.0000	0.0000	0.0000	0.0000
FEED	100.00	100.00	0.0000	0.0000	0.0000	0.0000
ERROR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM	100.00	100.00	0.0000	0.0000	0.0000	0.0000
RECIRC	100.00	100.00	0.0000	0.0000	0.0000	0.0000
TEMP	100.00	100.00	0.0000	0.0000	0.0000	0.0000
COEFF	100.00	100.00	0.0000	0.0000	0.0000	0.0000

TIME = 2.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	HEAT LOAD
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	100.00	100.00	0.0000	0.0000	0.0000	0.0000
FEED	100.00	100.00	0.0000	0.0000	0.0000	0.0000
ERROR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STEAM	100.00	100.00	0.0000	0.0000	0.0000	0.0000
RECIRC	100.00	100.00	0.0000	0.0000	0.0000	0.0000
TEMP	100.00	100.00	0.0000	0.0000	0.0000	0.0000
COEFF	100.00	100.00	0.0000	0.0000	0.0000	0.0000

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0434	0.3379	1.1451	70.38	128.20	14.87	-0.084841
2	0.2270	0.5993	0.8384	198.75	146.91	3.76	-0.238012
3	0.4089	0.7525	0.7898	217.62	163.45	3.62	-0.199950
4	0.5261	0.8168	0.9573	234.33	172.72	3.52	-0.098964
5	0.6806	0.8719	0.8861	93.39	182.14	3.37	-0.046538
6	0.7892	0.9166	1.0105	102.85	190.66	3.27	-0.022038
7	0.8715	0.9428	0.7645	111.40	195.51	3.18	-0.008566
8	0.9170	0.9642	0.8714	116.26	199.54	3.14	-0.002639
9	0.9534	0.9807	0.9886	120.29	202.43	3.10	-0.000567
10	0.9808	0.0000	0.0000	123.18	0.00	2.83	-0.004742

REFLUX	ERROR	FEED	FEED CONC.
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123.18	1.0825	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	199.41	216.00	6411.37	106407.19
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0393	0.3178	1.1454	73.08	126.90	14.88	-0.026024
2	0.2140	0.5830	0.8457	200.04	145.21	3.77	-0.085865
3	0.3976	0.7435	0.7672	218.40	162.14	3.63	-0.074929
4	0.5203	0.8146	0.9627	235.40	172.26	3.52	-0.038068
5	0.6786	0.8711	0.8861	95.25	181.89	3.37	-0.003902
6	0.7889	0.9166	1.0105	104.88	190.55	3.27	0.010983
7	0.8718	0.9429	0.7645	113.53	195.46	3.18	0.013933
8	0.9176	0.9644	0.8714	118.43	199.52	3.13	0.012575
9	0.9538	0.9809	0.9886	122.48	202.42	3.10	0.008297
10	0.9808	0.0000	0.0000	125.37	0.00	2.83	0.004820

REFLUX	ERROR	FEED	FEED CONC.
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125.37	1.0585	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.01	216.60	6411.37	106374.89
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TABLE U-18 CLOSED LOOP - STEP 1 - STEAM FLOW RATE -

TIME = 10.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	10L -	DERIVATIVE
1	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
2	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
3	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
4	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
5	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
6	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
7	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
8	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
9	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
10	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
REFLUX	1.0852	1.0852	1.0852	1.0852	1.0852	
FEED	1.0852	1.0852	1.0852	1.0852	1.0852	
ERROR	1.0852	1.0852	1.0852	1.0852	1.0852	
STEAM FLOW	1.0852	1.0852	1.0852	1.0852	1.0852	
REBOILER	1.0852	1.0852	1.0852	1.0852	1.0852	
TEMPERATURE	1.0852	1.0852	1.0852	1.0852	1.0852	
Coefficient	1.0852	1.0852	1.0852	1.0852	1.0852	
LOAD	1.0852	1.0852	1.0852	1.0852	1.0852	

TIME = 12.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
2	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
3	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
4	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
5	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
6	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
7	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
8	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
9	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
10	0.0434	0.0000	1.1441	1.1441	1.1441	-0.0000000
REFLUX	1.0852	1.0852	1.0852	1.0852	1.0852	
FEED	1.0852	1.0852	1.0852	1.0852	1.0852	
ERROR	1.0852	1.0852	1.0852	1.0852	1.0852	
STEAM FLOW	1.0852	1.0852	1.0852	1.0852	1.0852	
REBOILER	1.0852	1.0852	1.0852	1.0852	1.0852	
TEMPERATURE	1.0852	1.0852	1.0852	1.0852	1.0852	
Coefficient	1.0852	1.0852	1.0852	1.0852	1.0852	
HEAT LOAD	1.0852	1.0852	1.0852	1.0852	1.0852	

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 20.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0381	0.3121	1.1455	74.33	126.54	14.88	-0.004943
2	0.2103	0.5783	0.8478	200.88	144.78	3.77	-0.012838
3	0.3945	0.7409	0.7611	219.13	161.81	3.63	-0.008116
4	0.5190	0.8141	0.9638	236.16	172.21	3.52	0.001239
5	0.6793	0.8713	0.8861	96.26	181.97	3.37	0.016287
6	0.7904	0.9171	1.0105	106.01	190.73	3.27	0.020900
7	0.8733	0.9435	0.7645	114.75	195.71	3.18	0.018683
8	0.9188	0.9649	0.8714	119.70	199.79	3.13	0.015143
9	0.9546	0.9812	0.9886	123.77	202.70	3.10	0.009769
10	0.9811	0.0000	0.0000	126.68	0.00	2.83	0.007763

REFLUX	ERROR	FEED	FEED CONC.
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126.68	0.7646	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.19	216.78	6411.37	106365.56
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TIME = 25.00

PLATE	CCNCX	CCNCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0380	0.3120	1.1455	74.69	126.53	14.88	0.002165
2	0.2105	0.5785	0.8477	201.21	144.79	3.77	0.010794
3	0.3949	0.7412	0.7619	219.47	161.86	3.63	0.012741
4	0.5197	0.8143	0.9633	236.53	172.28	3.52	0.011988
5	0.6808	0.8718	0.8861	96.64	182.13	3.37	0.018125
6	0.7921	0.9177	1.0105	106.47	190.94	3.26	0.018595
7	0.8747	0.9441	0.7645	115.26	195.96	3.18	0.015410
8	0.9199	0.9654	0.8714	120.27	200.06	3.13	0.012090
9	0.9553	0.9815	0.9886	124.35	202.99	3.09	0.007769
10	0.9814	0.0000	0.0000	127.27	0.00	2.83	0.006934

REFLUX	ERROR	FEED	FEED CONC.
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127.27	0.4338	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.19	216.78	6411.37	106365.19
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TABLE U-1 CLOSED LOOP - STEP IN STEAM FLOW RATE -

TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOT - COLD	EFFICIENCY
1	0.0381	0.3121	1.1425	144.75	144.75	0.0000	0.0000
2	0.2103	0.2483	0.8477	144.75	144.75	0.0000	0.0000
3	0.3342	0.2409	0.1611	144.75	144.75	0.0000	0.0000
4	0.2190	0.8141	0.1441	144.75	144.75	0.0000	0.0000
5	0.6793	0.8713	0.8861	144.75	144.75	0.0000	0.0000
6	0.7294	0.9177	1.0102	144.75	144.75	0.0000	0.0000
7	0.8733	0.9432	0.1441	144.75	144.75	0.0000	0.0000
8	0.9118	0.1441	0.8714	144.75	144.75	0.0000	0.0000
9	0.9246	0.9812	0.9886	144.75	144.75	0.0000	0.0000
10	0.9811	0.0000	0.0000	144.75	144.75	0.0000	0.0000
REFLUX	126.68	0.7646	120.30	0.2126			
STEAM		TEMPERATURE					
FLW		REBOILER					
102.90	200.19	216.78	2411.37				

TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOT - COLD	EFFICIENCY
1	0.0381	0.3121	1.1425	144.75	144.75	0.0000	0.0000
2	0.2103	0.2483	0.8477	144.75	144.75	0.0000	0.0000
3	0.3342	0.2409	0.1611	144.75	144.75	0.0000	0.0000
4	0.2190	0.8141	0.1441	144.75	144.75	0.0000	0.0000
5	0.6793	0.8713	0.8861	144.75	144.75	0.0000	0.0000
6	0.7294	0.9177	1.0102	144.75	144.75	0.0000	0.0000
7	0.8733	0.9432	0.1441	144.75	144.75	0.0000	0.0000
8	0.9118	0.1441	0.8714	144.75	144.75	0.0000	0.0000
9	0.9246	0.9812	0.9886	144.75	144.75	0.0000	0.0000
10	0.9811	0.0000	0.0000	144.75	144.75	0.0000	0.0000
REFLUX	127.27	0.4338	121.30	0.2126			
STEAM		TEMPERATURE					
FLW		REBOILER					
102.90	200.19	216.78	2411.37				

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 30.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0383	0.3132	1.1455	74.58	126.60	14.88	0.002204
2	0.2114	0.5796	0.8472	201.18	144.90	3.77	0.009330
3	0.3960	0.7420	0.7640	219.47	161.98	3.63	0.010082
4	0.5206	0.8146	0.9624	236.54	172.36	3.52	0.007907
5	0.6820	0.8723	0.8876	96.61	182.26	3.37	0.010071
6	0.7934	0.9182	1.0099	106.50	191.09	3.26	0.012818
7	0.8758	0.9445	0.7645	115.32	196.14	3.18	0.008784
8	0.9207	0.9658	0.8714	120.37	200.24	3.13	0.007259
9	0.9558	0.9817	0.9886	124.46	203.18	3.09	0.004750
10	0.9817	0.0000	0.0000	127.39	0.00	2.83	0.004665

REFLUX	ERROR	FEED	FEED CONC.
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127.39	0.1774	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.16	216.75	6411.37	106366.92
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0384	0.3137	1.1455	74.36	126.63	14.88	0.000162
2	0.2119	0.5801	0.8469	200.99	144.94	3.77	0.001152
3	0.3964	0.7424	0.7649	219.30	162.03	3.63	0.001593
4	0.5210	0.8148	0.9621	236.39	172.38	3.52	0.001621
5	0.6826	0.8726	0.8889	96.44	182.32	3.37	0.003362
6	0.7941	0.9183	1.0062	106.37	191.14	3.26	0.004740
7	0.8762	0.9448	0.7670	115.19	196.23	3.18	0.002671
8	0.9212	0.9659	0.8702	120.28	200.33	3.13	0.004054
9	0.9561	0.9818	0.9880	124.37	203.27	3.09	0.002237
10	0.9818	0.0000	0.0000	127.31	0.00	2.83	0.001860

REFLUX	ERROR	FEED	FEED CONC.
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127.31	0.0271	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.15	216.74	6411.37	106367.66
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TABLE U-18 CLOSED LOOP - STEP 1 - 1000 HRS - 1000

TIME = 10.0

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	WELL-UP	DEVIATION
1	0.0388	0.3135	1.1452	150.44	150.44	14.98	0.00000
2	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
3	0.0320	0.2500	0.8874	150.44	150.44	14.98	0.00000
4	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
5	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
6	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
7	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
8	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
9	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
10	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
REFLUX	0.1774	150.30	0.2150				
STEAM							
FLW							
TEMPERATURE							
REBOILER							
COEFFICIENT							
HEAT LOAD							

TIME = 12.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOR	WELL-UP	DEVIATION
1	0.0388	0.3135	1.1452	150.44	150.44	14.98	0.00000
2	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
3	0.0320	0.2500	0.8874	150.44	150.44	14.98	0.00000
4	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
5	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
6	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
7	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
8	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
9	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
10	0.0314	0.2500	0.8874	150.44	150.44	14.98	0.00000
REFLUX	0.1774	150.30	0.2150				
STEAM							
FLW							
TEMPERATURE							
REBOILER							
COEFFICIENT							
HEAT LOAD							

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0384	0.3140	1.1455	74.37	126.65	14.88	0.000612
2	0.2121	0.5804	0.8468	201.02	144.97	3.77	0.002590
3	0.3967	0.7426	0.7655	219.34	162.06	3.63	0.002840
4	0.5212	0.8149	0.9619	236.43	172.40	3.52	0.002232
5	0.6829	0.8727	0.8897	96.47	182.36	3.37	0.003043
6	0.7945	0.9184	1.0041	106.42	191.17	3.26	0.003934
7	0.8764	0.9449	0.7702	115.23	196.29	3.18	0.002316
8	0.9215	0.9660	0.8672	120.35	200.38	3.13	0.003576
9	0.9563	0.9818	0.9807	124.43	203.32	3.09	0.001822
10	0.9818	0.0000	0.0000	127.37	0.00	2.83	0.000094

REFLUX	ERROR	FEED	FEED CONC.
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127.37	0.0014	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.14	216.73	6411.37	106368.10
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0384	0.3141	1.1455	74.27	126.65	14.88	-0.000389
2	0.2122	0.5804	0.8468	200.93	144.97	3.77	-0.001284
3	0.3968	0.7426	0.7656	219.25	162.07	3.63	-0.001035
4	0.5213	0.8149	0.9618	236.34	172.41	3.52	-0.000636
5	0.6830	0.8728	0.8900	96.38	182.37	3.37	0.000232
6	0.7947	0.9185	1.0031	106.35	191.18	3.26	0.000916
7	0.8766	0.9450	0.7720	115.16	196.32	3.18	0.000841
8	0.9217	0.9661	0.8654	120.30	200.41	3.13	0.001440
9	0.9564	0.9818	0.9767	124.38	203.34	3.09	0.000726
10	0.9818	0.0000	0.0000	127.31	0.00	2.83	0.000014

REFLUX	ERROR	FEED	FEED CONC.
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127.31	0.0002	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.14	216.73	6411.37	106368.18
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TABLE II-18 CLOSED LOOP - STEP IN STEAM FLOW RATE

TIME = 40.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT LOAD	COEFFICIENT	TEMPERATURE	REBOILER	STEAM	REFLUX	ERROR	FEED	FEED CONC.
10	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
9	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
8	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
7	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
6	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
5	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
4	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
3	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
2	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
1	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150

TIME = 42.00

PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT LOAD	COEFFICIENT	TEMPERATURE	REBOILER	STEAM	REFLUX	ERROR	FEED	FEED CONC.
10	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
9	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
8	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
7	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
6	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
5	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
4	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
3	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
2	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150
1	0.0000	0.0000	0.0000	157.37	0.00	2.83	0.0000	100.0	100.0	100.0	157.37	0.00	100.0	0.2150

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 50.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0384	0.3137	1.1455	74.19	126.63	14.88	-0.001192
2	0.2119	0.5801	0.8469	200.83	144.95	3.77	-0.004330
3	0.3965	0.7425	0.7652	219.14	162.04	3.63	-0.004037
4	0.5211	0.8148	0.9620	236.24	172.40	3.52	-0.002769
5	0.6830	0.8727	0.8898	96.30	182.36	3.37	-0.001802
6	0.7947	0.9185	1.0032	106.26	191.18	3.26	-0.001314
7	0.8766	0.9451	0.7723	115.08	196.32	3.18	-0.000259
8	0.9218	0.9661	0.8650	120.23	200.41	3.13	-0.000148
9	0.9564	0.9818	0.9757	124.31	203.34	3.09	-0.000034
10	0.9818	0.0000	0.0000	127.24	0.00	2.83	0.000014

REFLUX	ERROR	FEED	FEED CONC.
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127.24	0.0002	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.15	216.74	6411.37	106367.64
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0382	0.3131	1.1455	74.13	126.59	14.88	-0.001751
2	0.2115	0.5796	0.8472	200.72	144.90	3.77	-0.006439
3	0.3961	0.7421	0.7643	219.03	161.99	3.63	-0.006112
4	0.5208	0.8147	0.9622	236.13	172.37	3.52	-0.004232
5	0.6827	0.8726	0.8893	96.22	182.33	3.37	-0.003182
6	0.7945	0.9184	1.0041	106.18	191.16	3.26	-0.002827
7	0.8765	0.9450	0.7715	115.01	196.30	3.18	-0.001001
8	0.9217	0.9661	0.8655	120.15	200.39	3.13	-0.001226
9	0.9564	0.9818	0.9767	124.24	203.32	3.09	-0.000548
10	0.9818	0.0000	0.0000	127.17	0.00	2.83	0.000014

REFLUX	ERROR	FEED	FEED CONC.
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127.17	0.0002	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.17	216.76	6411.37	106366.65
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TABLE U-18 CLOSED LOOP - STEAM FLOW RATE - 100

TIME = 20.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOUR	HEAT	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX FEED FEED CONC.

157.24 100.00 100.00

STEAM TEMPERATURE RECYCLER STEAM COEFFICIENT HEAT LOAD

100.00 200.15 210.74 211.34

TIME = 20.00

PLATE	CONC	CONC	EFFICI	LIQUID	VAPOUR	HEAT	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

REFLUX FEED FEED CONC.

157.17 100.00 100.00

STEAM TEMPERATURE RECYCLER STEAM COEFFICIENT HEAT LOAD

100.00 200.15 210.74 211.34

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0381	0.3123	1.1455	74.08	126.54	14.88	-0.002135
2	0.2109	0.5788	0.8475	200.63	144.83	3.77	-0.007887
3	0.3955	0.7417	0.7632	218.92	161.93	3.63	-0.007535
4	0.5204	0.8146	0.9626	236.02	172.34	3.52	-0.005239
5	0.6824	0.8725	0.8886	96.14	182.29	3.37	-0.004124
6	0.7942	0.9184	1.0056	106.09	191.13	3.26	-0.003860
7	0.8764	0.9449	0.7700	114.94	196.26	3.18	-0.001507
8	0.9216	0.9660	0.8667	120.07	200.36	3.13	-0.001959
9	0.9563	0.9818	0.9791	124.17	203.29	3.09	-0.000897
10	0.9818	0.0000	0.0000	127.10	0.00	2.83	0.000014

REFLUX	ERROR	FEED	FEED CONC.
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127.10	0.0002	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.19	216.78	6411.37	106365.34
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0379	0.3113	1.1455	74.04	126.48	14.88	-0.002401
2	0.2102	0.5780	0.8479	200.53	144.75	3.77	-0.008888
3	0.3949	0.7411	0.7619	218.80	161.85	3.63	-0.008514
4	0.5200	0.8144	0.9630	235.91	172.30	3.52	-0.005933
5	0.6821	0.8723	0.8876	96.06	182.25	3.37	-0.004769
6	0.7939	0.9183	1.0074	106.01	191.10	3.26	-0.004566
7	0.8763	0.9448	0.7681	114.87	196.22	3.18	-0.001849
8	0.9214	0.9660	0.8683	119.99	200.32	3.13	-0.002459
9	0.9563	0.9818	0.9823	124.10	203.26	3.09	-0.001134
10	0.9818	0.0000	0.0000	127.04	0.00	2.83	0.000014

REFLUX	ERROR	FEED	FEED CONC.
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127.04	0.0002	150.30	0.5156
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STEAM FLOW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.22	216.81	6411.37	106363.82
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TABLE U-1 - CLOSED LOOP - STEP IN STEAM FLOW RATE

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
10	0.9818	0.0000	0.0000	127.10	127.10	100.00	100.00	100.00
9	0.9803	0.9818	0.9818	124.17	203.29	100.00	100.00	100.00
8	0.9812	0.9860	0.9860	127.07	207.16	100.00	100.00	100.00
7	0.9814	0.9449	0.9449	114.94	184.44	100.00	100.00	100.00
6	0.9824	0.9184	0.9184	100.00	191.13	100.00	100.00	100.00
5	0.9824	0.8722	0.8722	96.14	182.24	100.00	100.00	100.00
4	0.9817	0.8164	0.8164	237.02	172.16	100.00	100.00	100.00
3	0.9804	0.7416	0.7416	218.92	161.82	100.00	100.00	100.00
2	0.9810	0.6472	0.6472	144.72	144.72	100.00	100.00	100.00
1	0.9881	0.5132	0.5132	74.08	127.10	100.00	100.00	100.00
REFLUX	127.10	0.0002	127.30	0.2126				
FEED								
ERROR								
STEAM FLOW								
REBOILER								
TEMPERATURE								
COEFFICIENT								
HEAT LOAD								

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	TEMPERATURE	COEFFICIENT	HEAT LOAD
10	0.9818	0.0000	0.0000	127.04	127.04	100.00	100.00	100.00
9	0.9814	0.9818	0.9818	124.10	207.16	100.00	100.00	100.00
8	0.9814	0.9448	0.9448	114.87	191.22	100.00	100.00	100.00
7	0.9824	0.9183	0.9183	100.00	191.10	100.00	100.00	100.00
6	0.9824	0.8723	0.8723	96.14	182.24	100.00	100.00	100.00
5	0.9817	0.8164	0.8164	237.02	172.16	100.00	100.00	100.00
4	0.9804	0.7416	0.7416	218.90	161.82	100.00	100.00	100.00
3	0.9810	0.6472	0.6472	144.72	144.72	100.00	100.00	100.00
2	0.9881	0.5132	0.5132	74.04	127.04	100.00	100.00	100.00
REFLUX	127.04	0.0002	127.24	0.2126				
FEED								
ERROR								
STEAM FLOW								
REBOILER								
TEMPERATURE								
COEFFICIENT								
HEAT LOAD								

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 70.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0377	0.3102	1.1455	74.00	126.42	14.88	-0.002583
2	0.2094	0.5770	0.8483	200.43	144.67	3.77	-0.009564
3	0.3941	0.7405	0.7604	218.68	161.77	3.63	-0.009175
4	0.5194	0.8142	0.9635	235.79	172.26	3.52	-0.006407
5	0.6817	0.8721	0.8866	95.99	182.19	3.37	-0.005207
6	0.7935	0.9182	1.0094	105.93	191.07	3.26	-0.005047
7	0.8761	0.9447	0.7658	114.81	196.17	3.18	-0.002079
8	0.9212	0.9659	0.8702	119.91	200.28	3.13	-0.002799
9	0.9562	0.9818	0.9862	124.02	203.23	3.09	-0.001294
10	0.9818	0.0000	0.0000	126.97	0.00	2.83	0.000014

REFLUX	ERROR	FEED	FEED CONC.
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126.97	0.0002	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.25	216.84	6411.37	106362.15
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TIME = 75.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3092	1.1455	74.06	126.35	14.88	-0.001736
2	0.2086	0.5760	0.8486	200.42	144.58	3.77	-0.006471
3	0.3934	0.7400	0.7596	218.64	161.69	3.63	-0.007145
4	0.5190	0.8141	0.9638	235.77	172.22	3.52	-0.003461
5	0.6812	0.8719	0.8861	96.00	182.15	3.37	-0.003530
6	0.7931	0.9181	1.0105	105.92	191.03	3.26	-0.002797
7	0.8759	0.9446	0.7645	114.81	196.12	3.18	-0.001988
8	0.9210	0.9659	0.8714	119.90	200.24	3.13	-0.001382
9	0.9561	0.9818	0.9886	124.02	203.19	3.09	-0.000732
10	0.9818	0.0000	0.0000	126.97	0.00	2.83	-0.000554

REFLUX	ERROR	FEED	FEED CONC.
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126.97	0.0077	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.28	216.87	6411.37	106360.51
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TIME = 5.00

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 80.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0374	0.3087	1.1455	74.14	126.32	14.88	-0.000728
2	0.2083	0.5755	0.8486	200.46	144.53	3.77	-0.002666
3	0.3930	0.7398	0.7596	218.67	161.66	3.63	-0.002894
4	0.5188	0.8140	0.9638	235.80	172.21	3.52	-0.001338
5	0.6810	0.8719	0.8861	96.05	182.13	3.37	-0.001207
6	0.7929	0.9180	1.0105	105.97	191.01	3.26	-0.000916
7	0.8758	0.9445	0.7645	114.86	196.10	3.18	-0.000658
8	0.9209	0.9658	0.8714	119.95	200.22	3.13	-0.000470
9	0.9560	0.9818	0.9886	124.06	203.17	3.09	-0.000291
10	0.9818	0.0000	0.0000	127.02	0.00	2.83	-0.000329

REFLUX	ERROR	FEED	FEED CONC.
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127.02	0.0285	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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109.90	200.30	216.88	106359.74
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TIME = 85.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0373	0.3085	1.1455	74.18	126.31	14.88	-0.000112
2	0.2082	0.5754	0.8486	200.50	144.51	3.77	-0.000364
3	0.3929	0.7397	0.7596	218.70	161.65	3.63	-0.000374
4	0.5187	0.8140	0.9638	235.84	172.21	3.52	-0.000060
5	0.6810	0.8719	0.8861	96.09	182.13	3.37	0.000050
6	0.7929	0.9180	1.0105	106.01	191.01	3.26	0.000056
7	0.8758	0.9445	0.7645	114.89	196.10	3.18	0.000015
8	0.9209	0.9658	0.8714	119.98	200.21	3.13	0.000001
9	0.9560	0.9818	0.9886	124.10	203.17	3.09	-0.000011
10	0.9818	0.0000	0.0000	127.05	0.00	2.83	-0.000072

REFLUX	ERROR	FEED	FEED CONC.
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127.05	0.0373	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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109.90	200.30	216.89	106359.47
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TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE

TIME = 80.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOUR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	151.00	0.0000	150.30	0.0000		
FEED						
ERROR						
TEMPERATURE						
STEAM						
FLW						
COEFFICIENT						
HEAT LOAD						

TIME = 85.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOUR	HOLD-UP	DERIVATIVE
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REFLUX	151.00	0.0000	150.30	0.0000		
FEED						
ERROR						
TEMPERATURE						
STEAM						
FLW						
COEFFICIENT						
HEAT LOAD						

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 90.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0373	0.3085	1.1455	74.21	126.31	14.88	0.000216
2	0.2082	0.5754	0.8486	200.53	144.52	3.77	0.000840
3	0.3929	0.7397	0.7596	218.73	161.65	3.63	0.000939
4	0.5187	0.8140	0.9638	235.86	172.21	3.52	0.000568
5	0.6810	0.8719	0.8861	96.12	182.13	3.37	0.000628
6	0.7929	0.9180	1.0105	106.04	191.01	3.26	0.000494
7	0.8758	0.9445	0.7645	114.92	196.10	3.18	0.000322
8	0.9209	0.9658	0.8714	120.01	200.22	3.13	0.000220
9	0.9560	0.9818	0.9886	124.13	203.17	3.09	0.000124
10	0.9818	0.0000	0.0000	127.08	0.00	2.83	0.000075

REFLUX	ERROR	FEED	FEED CONC.
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127.08	0.0372	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.30	216.89	6411.37	106359.52
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TIME = 95.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0374	0.3086	1.1455	74.22	126.32	14.88	0.000310
2	0.2083	0.5755	0.8486	200.54	144.53	3.77	0.001173
3	0.3930	0.7398	0.7596	218.75	161.66	3.63	0.001286
4	0.5188	0.8140	0.9638	235.88	172.21	3.52	0.000702
5	0.6811	0.8719	0.8861	96.13	182.14	3.37	0.000713
6	0.7930	0.9181	1.0105	106.05	191.02	3.26	0.000550
7	0.8758	0.9445	0.7645	114.93	196.11	3.18	0.000367
8	0.9209	0.9658	0.8714	120.02	200.22	3.13	0.000257
9	0.9560	0.9818	0.9886	124.14	203.18	3.09	0.000149
10	0.9818	0.0000	0.0000	127.09	0.00	2.83	0.000123

REFLUX	ERROR	FEED	FEED CONC.
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127.09	0.0329	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.30	216.88	6411.37	106359.70
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TABLE U-1 - CLOSED LOOP - STEAM FLOW RATE -

TIME = 90.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HEAT UP	HEAT LOAD
1	0.0373	0.8777	1.1425	14.21	156.31	0.00516
2	0.0373	0.8777	0.8486	200.24	144.23	0.00966
3	0.0373	0.8777	0.7296	218.72	141.72	0.00939
4	0.0373	0.8777	0.6140	232.04	137.21	0.00905
5	0.0373	0.8777	0.4981	246.13	132.71	0.00871
6	0.0373	0.8777	0.3825	260.02	128.21	0.00837
7	0.0373	0.8777	0.2669	273.72	123.71	0.00803
8	0.0373	0.8777	0.1514	287.02	119.21	0.00769
9	0.0373	0.8777	0.0358	300.24	114.72	0.00735
10	0.0373	0.8777	0.0000	313.04	110.21	0.00701
REFLUX	0.0373	0.8777	150.3	0.0373	0.0373	
STEAM FLOW	200.30	516.84	6411.37	10832.25		

TIME = 95.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HEAT UP	HEAT LOAD
1	0.0374	0.8786	1.1425	14.21	156.31	0.00517
2	0.0374	0.8786	0.8486	200.24	144.23	0.00967
3	0.0374	0.8786	0.7296	218.72	141.72	0.00940
4	0.0374	0.8786	0.6140	232.04	137.21	0.00906
5	0.0374	0.8786	0.4981	246.13	132.71	0.00872
6	0.0374	0.8786	0.3825	260.02	128.21	0.00838
7	0.0374	0.8786	0.2669	273.72	123.71	0.00804
8	0.0374	0.8786	0.1514	287.02	119.21	0.00770
9	0.0374	0.8786	0.0358	300.24	114.72	0.00736
10	0.0374	0.8786	0.0000	313.04	110.21	0.00702
REFLUX	0.0374	0.8786	150.3	0.0374	0.0374	
STEAM FLOW	200.30	516.84	6411.37	10832.25		

TABLE U-18 CLOSED LOOP - STEP IN STEAM FLOW RATE - RUN 2

TIME = 100.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0374	0.3088	1.1455	74.22	126.33	14.88	0.000257
2	0.2084	0.5757	0.8486	200.55	144.54	3.77	0.000965
3	0.3931	0.7398	0.7596	218.76	161.67	3.63	0.001051
4	0.5189	0.8140	0.9638	235.88	172.22	3.52	0.000545
5	0.6811	0.8719	0.8861	96.13	182.14	3.37	0.000528
6	0.7930	0.9181	1.0105	106.05	191.02	3.26	0.000401
7	0.8759	0.9446	0.7645	114.94	196.11	3.18	0.000273
8	0.9209	0.9658	0.8714	120.02	200.23	3.13	0.000192
9	0.9560	0.9818	0.9886	124.14	203.18	3.09	0.000115
10	0.9818	0.0000	0.0000	127.09	0.00	2.83	0.000111

REFLUX	ERROR	FEED	FEED CONC.
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127.09	0.0280	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.29	216.88	6411.37	106359.89
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TIME = 105.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0374	0.3089	1.1455	74.21	126.33	14.88	0.000150
2	0.2084	0.5758	0.8486	200.54	144.55	3.77	0.000553
3	0.3932	0.7399	0.7596	218.76	161.68	3.63	0.000606
4	0.5189	0.8140	0.9638	235.88	172.22	3.52	0.000295
5	0.6812	0.8719	0.8861	96.13	182.14	3.37	0.000275
6	0.7931	0.9181	1.0105	106.05	191.03	3.26	0.000205
7	0.8759	0.9446	0.7645	114.93	196.11	3.18	0.000142
8	0.9209	0.9658	0.8714	120.02	200.23	3.13	0.000101
9	0.9560	0.9818	0.9886	124.14	203.19	3.09	0.000063
10	0.9818	0.0000	0.0000	127.09	0.00	2.83	0.000071

REFLUX	ERROR	FEED	FEED CONC.
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127.09	0.0243	150.30	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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109.90	200.29	216.88	6411.37	106360.04
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TABLE U-18 CLOSED LOOP - STEAM REFLUX - 102.00

TIME = 102.00

PLATE	CONV	EFFICI	LIQUID	VAPOR	HEAT TRANSFER
10	0.9818	0.0000	157.00	0.00	0.00000
9	0.9818	0.9818	154.14	203.18	0.00013
8	0.9209	0.9209	150.05	200.53	0.00013
7	0.8729	0.8729	144.25	190.11	0.00023
6	0.7931	0.7931	108.05	191.05	0.00041
5	0.6812	0.6812	108.05	182.14	0.00059
4	0.5118	0.5118	108.05	172.25	0.00077
3	0.3232	0.3232	108.05	161.68	0.00095
2	0.2084	0.2084	108.05	144.25	0.00113
1	0.0374	0.0374	108.05	144.25	0.00131
REFLUX	0.0380	150.30	0.2126		
FEED					
ERROR					
STEAM FLOW	102.90	200.29	216.88	641.37	108380.99
TEMPERATURE					
COEFFICIENT					
HEAT TRANSFER					

TIME = 102.00

PLATE	CONV	EFFICI	LIQUID	VAPOR	HEAT TRANSFER
10	0.9818	0.0000	157.00	0.00	0.00000
9	0.9818	0.9818	154.14	203.18	0.00013
8	0.9209	0.9209	150.05	200.53	0.00013
7	0.8729	0.8729	144.25	190.11	0.00023
6	0.7931	0.7931	108.05	191.05	0.00041
5	0.6812	0.6812	108.05	182.14	0.00059
4	0.5118	0.5118	108.05	172.25	0.00077
3	0.3232	0.3232	108.05	161.68	0.00095
2	0.2084	0.2084	108.05	144.25	0.00113
1	0.0374	0.0374	108.05	144.25	0.00131
REFLUX	0.0380	150.30	0.2126		
FEED					
ERROR					
STEAM FLOW	102.90	200.29	216.88	641.37	108380.99
TEMPERATURE					
COEFFICIENT					
HEAT TRANSFER					

TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0179	0.2333	1.1971	71.63	111.99	14.92	0.000002
2	0.1493	0.4295	0.7189	183.61	122.34	3.81	0.000005
3	0.2775	0.6626	0.8434	193.97	139.85	3.72	0.000005
4	0.4442	0.7819	0.9576	211.48	152.13	3.59	0.000003
5	0.5815	0.8338	0.8557	73.76	159.06	3.47	0.000001
6	0.7012	0.8852	1.0297	80.69	167.10	3.35	0.000000
7	0.8100	0.9203	0.8718	88.72	172.88	3.25	-0.000000
8	0.8787	0.9479	0.8601	94.51	177.52	3.18	-0.000001
9	0.9300	0.9704	0.9377	99.15	181.34	3.12	-0.000002
10	0.9704	0.0000	0.0000	102.97	0.00	2.84	-0.000000

REFLUX	ERROR	FEED	FEED CONC.
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102.97	0.0243	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	203.39	221.07	5537.24	97866.29
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0305	0.2948	1.1822	87.36	115.54	14.90	0.155322
2	0.1926	0.5083	0.7136	202.60	127.83	3.78	0.528235
3	0.3350	0.7012	0.7821	214.56	144.41	3.68	0.660708
4	0.4788	0.7981	0.9700	230.62	155.61	3.56	0.345520
5	0.6239	0.8488	0.8445	91.52	162.97	3.43	0.456654
6	0.7368	0.8938	0.9171	98.44	170.33	3.32	0.389123
7	0.8296	0.9292	0.9082	105.42	176.53	3.23	0.199236
8	0.8950	0.9544	0.8465	111.41	180.95	3.16	0.163376
9	0.9401	0.9732	0.8445	115.66	184.17	3.11	0.099240
10	0.9723	0.0000	0.0000	118.78	0.00	2.84	0.060160

REFLUX	ERROR	FEED	FEED CONC.
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118.78	2.6135	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	201.33	219.03	5537.24	98030.44
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TABLE 1 - CLOSED LOOP - STEP IN CORR. - SET PNT. - RUN

TIME = 0.00

PLATE CONC. CONCV EFFICI LIQUID VAPOR HLT - P AVAILABLE

1	0.0149	0.5333	1.1071	71.83	111.99	14.7	.
2	0.1493	0.4189	0.4189	183.91	183.91	3.81	0.0000
3	0.5271	0.6626	0.6626	193.97	193.97	3.7	.
4	0.7819	0.7819	0.7819	211.46	125.13	3.7	0.00003
5	0.981	0.981	0.981	23.78	13.7	3.47	0.00001
6	0.981	1.0297	1.0297	24.71	167.1	3.7	.
7	0.981	0.981	0.981	88.75	175.88	3.25	0.00000
8	0.981	0.9801	0.9801	94.91	177.5	3.18	.
9	0.981	0.9377	0.9377	101.34	181.34	3.1	.
10	0.9704	0.00	0.00	102.97	0.00	2.94	0.00000

REFLUX ERROR FEED FEED CONC.

102.97 0.0243 0.0150 0.2150

STEAM TEMPERATURE COEFFICIENT HEAT LOAD

FLW REFLUX STEAM

101.50 203.39 251.07 257.54 278.52

TIME = 2.00

PLATE CONC. CONCV EFFICI LIQUID VAPOR HLT - UP DERIVATIVE

1	0.0149	0.5333	1.1825	87.39	117.24	14.7	0.15325
2	0.1493	0.4189	0.4189	205.60	127.83	3.78	.
3	0.5333	0.7015	0.7015	214.56	144.41	3.68	0.01
4	0.7819	0.7819	0.7819	230.65	157.41	3.50	.
5	0.981	0.8447	0.8447	21.25	167.07	3.43	0.01
6	0.981	0.9171	0.9171	28.44	17.33	3.32	0.000123
7	0.981	0.9082	0.9082	107.45	176.23	3.23	0.00034
8	0.981	0.9844	0.9844	111.41	177.41	3.16	0.000376
9	0.981	0.9332	0.9332	112.06	177.17	3.11	0.00024
10	0.9723	0.0000	0.0000	11.73	0.00	2.94	0.00000

REFLUX ERROR FEED FEED CONC.

118.78 2.6132 120.00 0.2150

STEAM TEMPERATURE COEFFICIENT

FLW REFLUX STEAM

101.50 201.33 210.03 237.54 253.52

TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0416	0.3461	1.1692	82.15	118.65	14.88	0.100764
2	0.2292	0.5652	0.7092	200.60	132.54	3.76	0.338314
3	0.3782	0.7286	0.7366	214.27	147.76	3.65	0.358005
4	0.5017	0.8080	0.9774	229.20	157.75	3.54	0.201737
5	0.6525	0.8592	0.8376	89.00	165.54	3.40	0.229304
6	0.7609	0.9005	0.8477	96.57	172.48	3.29	0.186216
7	0.8422	0.9349	0.9276	103.33	178.71	3.21	0.113535
8	0.9051	0.9585	0.8394	109.44	182.98	3.15	0.076576
9	0.9463	0.9751	0.7928	113.63	185.83	3.10	0.047056
10	0.9744	0.0000	0.0000	116.43	0.00	2.84	0.045261

REFLUX	ERROR	FEED	FEED CONC.
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116.43	0.3466	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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101.50	199.66	217.39	5537.24 98162.46
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0470	0.3646	1.1692	75.86	119.87	14.87	0.027396
2	0.2436	0.5851	0.7092	195.68	134.34	3.75	0.060183
3	0.3940	0.7394	0.7366	210.11	149.27	3.63	0.062825
4	0.5101	0.8115	0.9774	224.99	158.53	3.53	0.022099
5	0.6621	0.8629	0.8376	84.23	166.47	3.39	0.028040
6	0.7688	0.9036	0.8477	92.14	173.42	3.29	0.026212
7	0.8475	0.9370	0.9276	99.06	179.53	3.21	0.019144
8	0.9085	0.9599	0.8394	105.15	183.71	3.14	0.013068
9	0.9484	0.9760	0.7928	109.32	186.49	3.10	0.009459
10	0.9757	0.0000	0.0000	112.09	0.00	2.84	0.017461

REFLUX	ERROR	FEED	FEED CONC.
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112.09	-1.0629	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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101.50	198.89	216.62	5537.24 98224.26
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TIME 15.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HEAT - W	DERIVATIVE
1	0.0410	0.3846	1.1895	1.1895	111.00	0.00000
2	0.0410	0.3846	0.7095	1.1895	135.24	0.00000
3	0.0410	0.3846	0.7386	1.1895	141.76	0.00000
4	0.0410	0.3846	0.7374	1.1895	157.75	0.00000
5	0.0410	0.3846	0.8376	0.8376	162.24	0.00000
6	0.0410	0.3846	0.8477	0.8477	175.48	0.00000
7	0.0410	0.3846	0.9349	1.0333	178.71	0.00000
8	0.0410	0.3846	0.9349	1.0444	182.7	0.00000
9	0.0410	0.3846	0.9349	1.13.63	185.83	0.00000
10	0.0410	0.3846	0.9349	1.16.43	0.00	0.00000

REFLUX 116.43
ERROR 0.3466
FEED 150.00
FEED CONC. 0.2129

STEAM FLOW 101.50
TEMPERATURE 198.89
COEFFICIENT 2537.24
HEAT LOSS 10554.50

TIME = 15.00

PLATE	CONCX	CONCV EFFICI	LIQUID	VAPOR	HEAT - W	DERIVATIVE
1	0.0410	0.3846	1.1895	1.1895	111.00	0.00000
2	0.0410	0.3846	0.7095	1.1895	135.24	0.00000
3	0.0410	0.3846	0.7386	1.1895	141.76	0.00000
4	0.0410	0.3846	0.7374	1.1895	157.75	0.00000
5	0.0410	0.3846	0.8376	0.8376	162.24	0.00000
6	0.0410	0.3846	0.8477	0.8477	175.48	0.00000
7	0.0410	0.3846	0.9349	1.0333	178.71	0.00000
8	0.0410	0.3846	0.9349	1.0444	182.7	0.00000
9	0.0410	0.3846	0.9349	1.13.63	185.83	0.00000
10	0.0410	0.3846	0.9349	1.16.43	0.00	0.00000

REFLUX 115.09
ERROR -1.0629
FEED 150.00
FEED CONC. 0.2129

STEAM FLOW 101.50
TEMPERATURE 198.89
COEFFICIENT 2537.24
HEAT LOSS 10554.50

TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0469	0.3640	1.1692	72.49	119.87	14.87	-0.022898
2	0.2427	0.5839	0.7092	192.40	134.27	3.75	-0.064143
3	0.3927	0.7388	0.7366	206.84	149.16	3.63	-0.072461
4	0.5085	0.8108	0.9774	221.79	158.35	3.53	-0.047019
5	0.6603	0.8622	0.8376	81.03	166.26	3.39	-0.054755
6	0.7676	0.9031	0.8477	88.98	173.22	3.29	-0.044489
7	0.8467	0.9367	0.9276	95.99	179.34	3.21	-0.031999
8	0.9080	0.9597	0.8394	102.14	183.54	3.14	-0.019824
9	0.9483	0.9759	0.7928	106.36	186.35	3.10	-0.010068
10	0.9760	0.0000	0.0000	109.18	0.00	2.84	-0.004220

REFLUX	ERROR	FEED	FEED CONC.
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109.18	-1.3145	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	198.90	216.64	5537.24	98223.02
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0443	0.3551	1.1692	71.61	119.31	14.87	-0.034590
2	0.2358	0.5745	0.7092	190.99	133.42	3.75	-0.088417
3	0.3850	0.7341	0.7366	205.16	148.47	3.64	-0.097059
4	0.5040	0.8090	0.9774	220.29	157.88	3.54	-0.054283
5	0.6550	0.8602	0.8376	79.74	165.69	3.40	-0.063877
6	0.7631	0.9013	0.8477	87.61	172.63	3.29	-0.055112
7	0.8434	0.9353	0.9276	94.61	178.79	3.21	-0.040979
8	0.9059	0.9588	0.8394	100.81	183.04	3.15	-0.026769
9	0.9472	0.9754	0.7928	105.09	185.90	3.10	-0.015271
10	0.9756	0.0000	0.0000	107.97	0.00	2.84	-0.012946

REFLUX	ERROR	FEED	FEED CONC.
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107.97	-0.8946	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBCILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.28	217.01	5537.24	98192.87
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TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 30.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0417	0.3467	1.1692	72.20	118.77	14.88	-0.022891
2	0.2296	0.5659	0.7092	191.02	132.65	3.76	-0.057751
3	0.3784	0.7291	0.7366	204.94	147.77	3.65	-0.059791
4	0.4998	0.8073	0.9774	220.10	157.46	3.54	-0.038643
5	0.6504	0.8585	0.8376	79.83	165.21	3.40	-0.042551
6	0.7592	0.8998	0.8477	87.61	172.14	3.30	-0.036386
7	0.8405	0.9342	0.9276	94.58	178.31	3.21	-0.027191
8	0.9040	0.9580	0.8394	100.78	182.61	3.15	-0.018290
9	0.9460	0.9748	0.7928	105.10	185.51	3.10	-0.011078
10	0.9750	0.0000	0.0000	108.02	0.00	2.84	-0.011539

REFLUX	ERROR	FEED	FEED CONC.
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108.02	-0.3308	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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101.50	199.65	217.37	5537.24	98163.84
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TIME = 35.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0405	0.3411	1.1703	72.92	118.42	14.88	-0.009728
2	0.2258	0.5608	0.7096	191.36	132.19	3.76	-0.030811
3	0.3745	0.7265	0.7400	205.16	147.43	3.65	-0.033346
4	0.4977	0.8063	0.9767	220.42	157.26	3.54	-0.016965
5	0.6479	0.8575	0.8382	80.26	164.97	3.40	-0.020967
6	0.7569	0.8992	0.8533	87.99	171.92	3.30	-0.018590
7	0.8390	0.9335	0.9258	94.97	178.08	3.22	-0.010341
8	0.9029	0.9575	0.8399	101.13	182.39	3.15	-0.009125
9	0.9453	0.9746	0.7962	105.45	185.32	3.11	-0.006313
10	0.9747	0.0000	0.0000	108.39	0.00	2.84	-0.005236

REFLUX	ERROR	FEED	FEED CONC.
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108.39	0.0400	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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101.50	199.82	217.55	5537.24	98149.79
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TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET POINT

TIME = 31.00

PLATE CONC. CONCV EFFICI LIQUID VAP. HOLD-UP DERIVATIVE

1	0.0010	0.0000	1.1895	15.20	118.11	14.10	-0.025801
2	0.0020	0.0000	0.1095	191.05	135.05	1.10	-0.001191
3	0.0030	0.0000	0.1391	204.94	141.11	1.10	-0.001191
4	0.0040	0.0000	0.1687	218.83	147.16	1.10	-0.001191
5	0.0050	0.0000	0.1983	232.72	153.21	1.10	-0.001191
6	0.0060	0.0000	0.2279	246.61	159.26	1.10	-0.001191
7	0.0070	0.0000	0.2575	260.50	165.31	1.10	-0.001191
8	0.0080	0.0000	0.2871	274.39	171.36	1.10	-0.001191
9	0.0090	0.0000	0.3167	288.28	177.41	1.10	-0.001191
10	0.0100	0.0000	0.3463	302.17	183.46	1.10	-0.001191

REFLUX FEED FEED CONC.

108.00 -0.3300 100.00 0.2150

STEAM FLOW REFRIGILIER TEMPERATURE COEFFICIENT HEAT LOAD

101.50 199.85 515.35 2237.24 98183.84

TIME = 32.00

PLATE CONC. CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.0010	0.0000	1.1704	15.20	118.11	14.88	-0.000930
2	0.0020	0.0000	0.1095	191.36	141.16	1.10	-0.001191
3	0.0030	0.0000	0.1391	205.16	147.16	1.10	-0.001191
4	0.0040	0.0000	0.1687	219.05	153.21	1.10	-0.001191
5	0.0050	0.0000	0.1983	232.94	159.26	1.10	-0.001191
6	0.0060	0.0000	0.2279	246.83	165.31	1.10	-0.001191
7	0.0070	0.0000	0.2575	260.72	171.36	1.10	-0.001191
8	0.0080	0.0000	0.2871	274.61	177.41	1.10	-0.001191
9	0.0090	0.0000	0.3167	288.50	183.46	1.10	-0.001191
10	0.0100	0.0000	0.3463	302.39	189.51	1.10	-0.001191

REFLUX FEED FEED CONC.

108.30 0.0000 100.00 0.2150

STEAM FLOW REFRIGILIER TEMPERATURE COEFFICIENT HEAT LOAD

101.50 199.85 515.35 2237.24 98183.84

TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0401	0.3394	1.1708	73.63	118.31	14.88	-0.000489
2	0.2245	0.5588	0.7098	191.94	132.02	3.76	-0.001975
3	0.3730	0.7255	0.7416	205.65	147.31	3.65	-0.002509
4	0.4970	0.8060	0.9765	220.95	157.20	3.54	-0.000165
5	0.6470	0.8572	0.8384	80.83	164.90	3.41	-0.000573
6	0.7562	0.8990	0.8557	88.53	171.87	3.30	-0.000756
7	0.8386	0.9333	0.9251	95.50	178.02	3.22	-0.000082
8	0.9025	0.9574	0.8403	101.65	182.33	3.15	-0.000479
9	0.9450	0.9745	0.7988	105.97	185.28	3.11	-0.000683
10	0.9745	0.0000	0.0000	108.92	0.00	2.84	-0.001420

REFLUX	ERROR	FEED	FEED CONC.
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108.92	0.1824	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.88	217.61	5537.24	98145.24
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0403	0.3402	1.1705	74.05	118.35	14.88	0.004224
2	0.2251	0.5597	0.7097	192.40	132.09	3.76	0.013423
3	0.3737	0.7259	0.7409	206.13	147.37	3.65	0.016019
4	0.4974	0.8062	0.9766	221.39	157.25	3.54	0.009452
5	0.6475	0.8574	0.8383	81.26	164.95	3.40	0.010765
6	0.7566	0.8991	0.8544	88.96	171.91	3.30	0.008923
7	0.8389	0.9335	0.9255	95.91	178.07	3.22	0.005080
8	0.9027	0.9574	0.8401	102.06	182.38	3.15	0.003921
9	0.9451	0.9745	0.7980	106.36	185.32	3.11	0.002246
10	0.9745	0.0000	0.0000	109.30	0.00	2.84	0.000862

REFLUX	ERROR	FEED	FEED CONC.
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109.30	0.1896	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.85	217.58	5537.24	98147.38
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TABLE U-1 CLOSED LOOP - STEP 1 - CONT. SET POINT - 100

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT LOSS
10	0.9742	0.0000	0.0000	0.00	0.00	2.84
9	0.9742	0.9742	0.9742	102.97	102.97	3.11
8	0.9742	0.9742	0.9742	102.97	102.97	3.11
7	0.9742	0.9742	0.9742	102.97	102.97	3.11
6	0.9742	0.9742	0.9742	102.97	102.97	3.11
5	0.9742	0.9742	0.9742	102.97	102.97	3.11
4	0.9742	0.9742	0.9742	102.97	102.97	3.11
3	0.9742	0.9742	0.9742	102.97	102.97	3.11
2	0.9742	0.9742	0.9742	102.97	102.97	3.11
1	0.9742	0.9742	0.9742	102.97	102.97	3.11
REFLUX	108.92	0.1824	120.00	0.2126		
STEAM						
FLW	101.30	199.88	215.61			

TIME = 42.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HEAT LOSS
10	0.9742	0.0000	0.0000	0.00	0.00	2.84
9	0.9742	0.9742	0.9742	102.97	102.97	3.11
8	0.9742	0.9742	0.9742	102.97	102.97	3.11
7	0.9742	0.9742	0.9742	102.97	102.97	3.11
6	0.9742	0.9742	0.9742	102.97	102.97	3.11
5	0.9742	0.9742	0.9742	102.97	102.97	3.11
4	0.9742	0.9742	0.9742	102.97	102.97	3.11
3	0.9742	0.9742	0.9742	102.97	102.97	3.11
2	0.9742	0.9742	0.9742	102.97	102.97	3.11
1	0.9742	0.9742	0.9742	102.97	102.97	3.11
REFLUX	109.30	0.1896	120.00	0.2126		
STEAM						
FLW	101.30	199.88	215.61			

TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0407	0.3421	1.1700	74.18	118.47	14.88	0.005410
2	0.2265	0.5617	0.7095	192.63	132.27	3.76	0.018013
3	0.3752	0.7269	0.7392	206.42	147.49	3.65	0.018931
4	0.4983	0.8066	0.9770	221.63	157.34	3.54	0.010821
5	0.6486	0.8578	0.8380	81.47	165.06	3.40	0.012901
6	0.7574	0.8993	0.8517	89.18	172.00	3.30	0.010832
7	0.8393	0.9337	0.9264	96.11	178.16	3.22	0.005916
8	0.9030	0.9576	0.8398	102.26	182.46	3.15	0.004707
9	0.9453	0.9746	0.7959	106.56	185.39	3.11	0.002867
10	0.9746	0.0000	0.0000	109.48	0.00	2.84	0.001653

REFLUX	ERROR	FEED	FEED CONC.
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109.48	0.1304	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.79	217.52	5537.24	98152.20
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0412	0.3439	1.1696	74.11	118.58	14.88	0.004301
2	0.2278	0.5635	0.7094	192.68	132.43	3.76	0.013975
3	0.3767	0.7279	0.7377	206.52	147.61	3.65	0.014521
4	0.4991	0.8070	0.9772	221.69	157.42	3.54	0.007938
5	0.6495	0.8581	0.8378	81.49	165.15	3.40	0.009464
6	0.7583	0.8995	0.8491	89.21	172.08	3.30	0.008000
7	0.8398	0.9339	0.9272	96.13	178.24	3.22	0.004275
8	0.9034	0.9577	0.8395	102.30	182.54	3.15	0.003458
9	0.9456	0.9747	0.7939	106.59	185.45	3.10	0.002171
10	0.9747	0.0000	0.0000	109.50	0.00	2.84	0.001465

REFLUX	ERROR	FEED	FEED CONC.
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109.50	0.0598	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.73	217.46	5537.24	98156.98
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TIME 10:00

10.000 3417

TABLE U-19 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 1

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0414	0.3452	1.1692	73.96	118.66	14.88	0.002220
2	0.2287	0.5647	0.7093	192.62	132.53	3.76	0.007182
3	0.3776	0.7285	0.7367	206.48	147.69	3.65	0.007424
4	0.4996	0.8072	0.9774	221.63	157.47	3.54	0.003754
5	0.6501	0.8584	0.8376	81.41	165.20	3.40	0.004470
6	0.7587	0.8997	0.8477	89.14	172.12	3.30	0.003657
7	0.8400	0.9340	0.9276	96.06	178.29	3.22	0.002112
8	0.9036	0.9578	0.8394	102.22	182.58	3.15	0.001486
9	0.9457	0.9747	0.7928	106.51	185.49	3.10	0.000951
10	0.9747	0.0000	0.0000	109.42	0.00	2.84	0.000965

REFLUX	ERROR	FEED	FEED CONC.
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109.42	0.0080	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.69	217.42	5537.24	98160.17
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0415	0.3456	1.1692	73.82	118.69	14.88	0.000249
2	0.2290	0.5652	0.7092	192.51	132.57	3.76	0.001065
3	0.3779	0.7287	0.7366	206.39	147.72	3.65	0.001095
4	0.4998	0.8073	0.9774	221.53	157.48	3.54	0.000475
5	0.6503	0.8584	0.8376	81.29	165.22	3.40	0.000297
6	0.7589	0.8997	0.8477	89.03	172.14	3.30	0.000179
7	0.8401	0.9340	0.9276	95.95	178.30	3.21	0.000072
8	0.9036	0.9578	0.8394	102.12	182.59	3.15	0.000043
9	0.9457	0.9747	0.7928	106.41	185.50	3.10	0.000067
10	0.9747	0.0000	0.0000	109.31	0.00	2.84	0.000265

REFLUX	ERROR	FEED	FEED CONC.
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109.31	-0.0189	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	199.68	217.41	5537.24	98161.22
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30.03 = MIT

TIME = 02.00

TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 0.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0375	0.3342	1.1820	73.56	118.07	14.88	0.000003
2	0.2203	0.5495	0.7019	191.64	131.35	3.76	0.000006
3	0.3657	0.7329	0.8427	204.92	148.21	3.66	0.000004
4	0.5022	0.8080	0.9731	221.77	157.58	3.54	0.000001
5	0.6501	0.8562	0.7934	81.15	164.81	3.40	0.000003
6	0.7530	0.9002	0.9230	88.37	172.23	3.30	-0.000002
7	0.8400	0.9336	0.9107	95.79	178.19	3.22	0.000000
8	0.9019	0.9570	0.8329	101.75	182.40	3.15	-0.000001
9	0.9436	0.9757	0.9118	105.96	185.71	3.11	-0.000001
10	0.9757	0.0000	0.0000	109.28	0.00	2.84	-0.000000

REFLUX	ERROR	FEED	FEED CONC.
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109.28	-0.0189	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	200.27	219.25	5170.51	98160.63
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TIME = 5.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0611	0.4202	1.1820	95.96	122.95	14.84	0.330458
2	0.2859	0.6149	0.6224	218.21	137.10	3.72	0.825569
3	0.4225	0.7782	1.0671	231.77	154.01	3.61	0.660366
4	0.5466	0.8240	0.9288	248.11	160.70	3.50	0.429441
5	0.6910	0.8751	0.8691	104.40	168.87	3.36	0.458649
6	0.7914	0.9134	0.8792	112.13	175.54	3.26	0.442942
7	0.8650	0.9434	0.8995	118.37	180.99	3.19	0.285120
8	0.9185	0.9637	0.8076	123.52	184.58	3.13	0.182016
9	0.9532	0.9788	0.8361	126.91	187.13	3.10	0.101387
10	0.9778	0.0000	0.0000	129.36	0.00	2.83	0.071415

REFLUX	ERROR	FEED	FEED CONC.
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129.36	3.5022	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	196.83	215.83	5170.51	98232.65
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TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 10.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0878	0.4908	1.1819	91.04	127.61	14.78	0.279308
2	0.3426	0.6608	0.5539	218.05	141.86	3.67	0.529276
3	0.4641	0.8020	1.2222	231.89	157.84	3.57	0.344510
4	0.5718	0.8324	0.9106	247.57	162.59	3.48	0.163747
5	0.7189	0.8867	0.9053	102.17	171.60	3.34	0.218380
6	0.8187	0.9232	0.8540	110.96	178.09	3.24	0.201193
7	0.8834	0.9508	0.8925	117.24	183.14	3.17	0.155039
8	0.9304	0.9686	0.7913	122.13	186.23	3.12	0.102939
9	0.9600	0.9813	0.7838	125.11	188.22	3.09	0.061437
10	0.9805	0.0000	0.0000	127.03	0.00	2.83	0.055096

REFLUX	ERROR	FEED	FEED CONC.
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127.03	0.6821	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	193.11	212.13	5170.51	98310.71
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TIME = 15.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.1040	0.5248	1.1819	83.49	130.27	14.74	0.112491
2	0.3685	0.6874	0.5505	213.50	144.56	3.65	0.147709
3	0.4839	0.8092	1.2222	227.68	158.93	3.56	0.101770
4	0.5775	0.8344	0.9106	241.96	162.96	3.47	0.005260
5	0.7270	0.8896	0.9053	95.98	172.20	3.33	0.007740
6	0.8270	0.9266	0.8540	105.21	178.84	3.23	0.021817
7	0.8905	0.9537	0.8925	111.83	183.83	3.16	0.026655
8	0.9354	0.9708	0.7913	116.79	186.77	3.12	0.024058
9	0.9632	0.9827	0.7838	119.71	188.59	3.09	0.018463
10	0.9823	0.0000	0.0000	121.51	0.00	2.83	0.027822

REFLUX	ERROR	FEED	FEED CONC.
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121.51	-1.2500	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	191.06	210.09	5170.51	98353.68
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TABLE U-20 CLOSET LOOP - STEP IN COM. CONT. SET PNT. - 100

TIME = 10.00									
PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE		
1	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
2	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
3	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
4	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
5	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
6	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
7	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
8	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
9	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
10	0.0000	0.0000	1.1819	91.04	151.61	14.78	0.29300	101.20	9831.41
REFLUX ERROR FEED FEED CONC.									
151.03	0.0000	150.00	0.0000						
STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOAD									
101.20	103.11	215.13	2170.21	9831.41					

TIME = 11.00									
PLATE	CONCX	CONCA	EFFICI	LIQUID	VAPOR	HEAT-UP	DERIVATIVE		
1	0.1040	0.0703	1.1111	130.57	130.57	14.74	0.11271	101.20	9831.41
2	0.3882	0.2874	0.7407	144.22	144.22	7.78	0.14717	210.09	2170.21
3	0.4839	0.3804	1.2522	158.93	158.93	8.26	0.10177	2170.21	9831.41
4	0.2177	0.1444	0.7104	162.96	162.96	3.47	0.00000	9831.41	101.20
5	0.1271	0.0839	0.6577	175.78	175.78	3.22	0.00000	101.20	9831.41
6	0.8278	0.7288	0.8840	102.21	178.84	7.23	0.05181	9831.41	101.20
7	0.9937	0.9237	0.9237	111.83	183.83	3.16	0.00000	101.20	9831.41
8	0.9324	0.9708	0.1013	116.79	186.77	3.17	0.00000	101.20	9831.41
9	0.9877	0.9827	0.1838	119.71	188.22	3.03	0.01846	101.20	9831.41
10	0.9877	0.0000	0.0000	121.21	0.00	2.82	0.00000	101.20	9831.41
REFLUX	FEED	FEED	FEED CONC.						
121.21	-1.250	120.00	0.2120						
STEAM	REBOILER	TEMPERATURE	COEFFICIENT	HEAT LOAD					
101.20	101.06	210.09	2170.21	9831.41					

TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 20.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1079	0.5316	1.1819	78.46	130.80	14.74	-0.010349
2	0.3720	0.6911	0.5505	209.29	144.92	3.65	-0.048382
3	0.4847	0.8092	1.2222	223.44	158.80	3.55	-0.054939
4	0.5750	0.8335	0.9106	237.37	162.62	3.47	-0.052637
5	0.7237	0.8884	0.9053	91.23	171.75	3.33	-0.070992
6	0.8252	0.9258	0.8540	100.44	178.45	3.23	-0.053804
7	0.8898	0.9533	0.8925	107.20	183.53	3.16	-0.035876
8	0.9354	0.9707	0.7913	112.31	186.54	3.12	-0.019119
9	0.9635	0.9828	0.7838	115.33	188.38	3.09	-0.008130
10	0.9828	0.0000	0.0000	117.19	0.00	2.83	-0.000586

REFLUX ERROR FEED FEED CONC.

117.19 -1.8103 150.00 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	190.58	209.60	5170.51	98363.90
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TIME = 25.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
1	0.1042	0.5239	1.1819	76.18	130.20	14.74	-0.065760
2	0.3641	0.6849	0.5505	206.52	144.24	3.66	-0.118042
3	0.4776	0.8065	1.2222	220.66	158.24	3.56	-0.109052
4	0.5702	0.8319	0.9106	234.76	162.14	3.48	-0.056908
5	0.7172	0.8860	0.9053	88.71	171.08	3.34	-0.077497
6	0.8198	0.9235	0.8540	97.72	177.76	3.24	-0.067327
7	0.8858	0.9517	0.8925	104.47	182.94	3.17	-0.051753
8	0.9331	0.9697	0.7913	109.70	186.06	3.12	-0.033222
9	0.9623	0.9822	0.7838	112.86	188.01	3.09	-0.018649
10	0.9824	0.0000	0.0000	114.83	0.00	2.83	-0.014984

REFLUX ERROR FEED FEED CONC.

114.83 -1.4188 150.00 0.5156

STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	191.04	210.06	5170.51	98354.19
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TIME = 50.00

PLATE CONGX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.1079	0.5316	1.1819	78.46	144.94	14.74	-0.01034
2	0.3750	0.6911	0.7747	509.22	144.92	3.62	-0.04000
3	0.4847	0.8092	1.2522	577.77	128.97	3.55	-0.03493
4	0.5777	0.8888	0.9100	537.37	102.62	3.47	-0.03000
5	0.7237	0.9888	0.9023	01.23	171.72	3.33	-0.07092
6	0.8898	0.9999	0.8240	107.44	178.42	3.23	-0.07100
7	0.9898	0.9999	0.8252	107.20	183.23	3.16	-0.03277
8	0.9324	0.9707	0.7913	112.31	187.77	3.12	-0.01919
9	0.9632	0.9777	0.7837	112.33	188.38	3.06	-0.00813
10	0.9828	0.9900	0.7800	117.19	0.00	3.03	-0.00000

REFLUX ERROR FEED FEED CORR.

117.19 -1.4103 150.00 0.2129

STEAM TEMPERATURE COEFFICIENT HEAT LOSS

FLW REBOILER STEAM

101.20 190.28 209.40 2170.21 2830.22

TIME = 52.00

PLATE CONGX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE

1	0.1042	0.5239	1.1819	76.18	144.72	14.72	-0.06277
2	0.3641	0.6849	0.7202	506.22	144.24	3.66	-0.11802
3	0.4476	0.8062	1.2522	520.66	144.24	3.56	-0.10902
4	0.5702	0.8888	0.9100	534.76	144.24	3.40	-0.02000
5	0.7172	0.9888	0.9023	88.71	171.08	3.34	-0.12497
6	0.8198	0.9232	0.8240	77.72	171.72	3.24	-0.12727
7	0.8898	0.9217	0.7922	104.47	182.94	3.17	-0.02122
8	0.9324	0.9697	0.7913	104.77	186.66	3.12	-0.03222
9	0.9632	0.9822	0.7838	112.86	188.01	3.07	-0.11802
10	0.9828	0.9900	0.7800	114.88	0.00	3.02	-0.00000

REFLUX ERROR FEED FEED CORR.

114.83 -1.4188 150.00 0.2129

STEAM TEMPERATURE COEFFICIENT HEAT LOSS

FLW REBOILER STEAM

101.20 191.04 210.00 2170.21 2830.22

TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 30.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0985	0.5125	1.1819	76.04	129.34	14.76	-0.066653
2	0.3542	0.6753	0.5505	205.52	143.27	3.66	-0.109075
3	0.4687	0.8032	1.2222	219.54	157.70	3.57	-0.095180
4	0.5661	0.8305	0.9106	234.05	161.82	3.48	-0.038998
5	0.7117	0.8840	0.9053	88.21	170.61	3.34	-0.051457
6	0.8149	0.9216	0.8540	97.05	177.26	3.24	-0.048280
7	0.8820	0.9501	0.8925	103.75	182.49	3.17	-0.038337
8	0.9305	0.9685	0.7913	109.02	185.70	3.12	-0.026769
9	0.9607	0.9815	0.7838	112.26	187.75	3.09	-0.016524
10	0.9817	0.0000	0.0000	114.32	0.00	2.83	-0.016408

REFLUX	ERROR	FEED	FEED CONC.
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114.32	-0.6925	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	191.77	210.79	5170.51	98338.96
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TIME = 35.00

PLATE	CCNCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0939	0.5031	1.1819	76.90	128.64	14.77	-0.041848
2	0.3469	0.6678	0.5505	205.63	142.50	3.67	-0.071075
3	0.4625	0.8009	1.2222	219.54	157.32	3.57	-0.056847
4	0.5639	0.8297	0.9116	234.41	161.64	3.48	-0.017914
5	0.7089	0.8829	0.9022	88.76	170.33	3.35	-0.019262
6	0.8119	0.9205	0.8557	97.46	176.98	3.24	-0.023451
7	0.8796	0.9492	0.8929	104.13	182.22	3.17	-0.018325
8	0.9288	0.9678	0.7920	109.39	185.47	3.12	-0.013840
9	0.9597	0.9810	0.7848	112.66	187.57	3.09	-0.009360
10	0.9812	0.0000	0.0000	114.77	0.00	2.83	-0.009777

REFLUX	ERROR	FEED	FEED CONC.
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114.77	-0.0906	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.35	211.37	5170.51	98326.72
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TABLE U-20 CLOSED LOOP - STEP IN CONC. CONT. PLT. - 300

TIME : 30.00									
PLATE CONCX CONC EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE									
1	0.0000	0.0000	0.0000	114.35	0.00	151.84	14.7	-0.00000	
2	0.0000	0.0000	0.0000	114.35	0.00	151.84	3.00	-0.00000	
3	0.0000	0.0000	0.0000	114.35	0.00	151.84	3.25	-0.00000	
4	0.0000	0.0000	0.0000	114.35	0.00	151.84	3.48	-0.00000	
5	0.0000	0.0000	0.0000	114.35	0.00	151.84	3.68	-0.00000	
6	0.0000	0.0000	0.0000	114.35	0.00	151.84	3.88	-0.00000	
7	0.0000	0.0000	0.0000	114.35	0.00	151.84	4.08	-0.00000	
8	0.0000	0.0000	0.0000	114.35	0.00	151.84	4.28	-0.00000	
9	0.0000	0.0000	0.0000	114.35	0.00	151.84	4.48	-0.00000	
10	0.0000	0.0000	0.0000	114.35	0.00	151.84	4.68	-0.00000	
REFLUX ERROR FEED FEED CONC.									
114.35	-0.0000	150.00	0.2150						
STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOSS									
101.50	191.77	210.79	210.51						

TIME : 32.00									
PLATE CONCX CONCV EFFICI LIQUID VAPOR HOLD-UP DERIVATIVE									
1	0.0000	0.0000	1.1819	76.90	158.64	14.77	-0.00000		
2	0.0000	0.0000	0.2502	502.63	143.77	1.00	-0.00000		
3	0.0000	0.0000	1.2522	519.24	157.32	3.25	-0.00000		
4	0.0000	0.0000	0.0000	334.41	161.64	3.48	-0.00000		
5	0.0000	0.0000	0.0000	88.76	171.37	3.68	-0.00000		
6	0.0000	0.0000	0.0000	97.88	176.98	3.88	-0.00000		
7	0.0000	0.0000	0.0000	104.13	182.22	4.08	-0.00000		
8	0.0000	0.0000	0.0000	109.39	187.47	4.28	-0.00000		
9	0.0000	0.0000	0.0000	112.66	187.27	4.48	-0.00000		
10	0.0000	0.0000	0.0000	114.77	187.27	4.68	-0.00000		
REFLUX ERROR FEED FEED CONC.									
114.77	-0.0000	150.00	0.2150						
STEAM REBOILER STEAM TEMPERATURE COEFFICIENT HEAT LOSS									
101.50	191.77	210.79	210.51						

TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0913	0.4969	1.1819	77.73	128.20	14.77	-0.020315
2	0.3423	0.6639	0.5542	205.97	142.10	3.67	-0.034077
3	0.4594	0.7995	1.2126	219.91	157.11	3.58	-0.018477
4	0.5628	0.8294	0.9126	234.93	161.59	3.48	-0.004050
5	0.7079	0.8825	0.9005	89.42	170.25	3.35	-0.002254
6	0.8107	0.9201	0.8571	98.08	176.89	3.25	-0.004390
7	0.8787	0.9488	0.8933	104.72	182.13	3.18	-0.004354
8	0.9280	0.9675	0.7931	109.97	185.40	3.12	-0.004027
9	0.9591	0.9808	0.7889	113.24	187.53	3.09	-0.003079
10	0.9809	0.0000	0.0000	115.38	0.00	2.83	-0.003746

REFLUX	ERROR	FEED	FEED CONC.
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115.38	0.1948	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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101.50	192.68	211.69	5170.51	98319.88
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TIME = 45.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0904	0.4949	1.1819	78.48	128.05	14.77	-0.002265
2	0.3410	0.6628	0.5557	206.53	141.99	3.67	0.000559
3	0.4589	0.7992	1.2105	220.47	157.09	3.58	0.003445
4	0.5630	0.8295	0.9125	235.57	161.62	3.48	0.006378
5	0.7083	0.8827	0.9012	90.09	170.31	3.35	0.008861
6	0.8110	0.9202	0.8568	98.77	176.93	3.25	0.008299
7	0.8788	0.9488	0.8933	105.39	182.17	3.18	0.005133
8	0.9280	0.9675	0.7932	110.62	185.43	3.12	0.002876
9	0.9591	0.9808	0.7894	113.87	187.56	3.09	0.001307
10	0.9808	0.0000	0.0000	116.00	0.00	2.83	0.000051

REFLUX	ERROR	FEED	FEED CONC.
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116.00	0.2699	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	COEFFICIENT STEAM	HEAT LOAD
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101.50	192.79	211.80	5170.51	98317.54
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TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET POINT

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	INITIAL
1	0.0018	0.4488	1.1819	17.13	158.50	14.17	-0.050318
2	0.3423	0.4488	0.2242	202.97	142.11	3.67	-0.034017
3	0.4488	0.4488	1.1819	219.91	147.11	1.58	-0.018417
4	0.2624	0.4488	0.2125	147.97	161.97	1.47	-0.007717
5	0.1079	0.4488	0.2002	89.42	172.97	3.25	-0.005294
6	0.0107	0.4488	0.2002	176.89	176.89	3.25	-0.004301
7	0.8187	0.4488	0.8433	104.72	182.13	3.11	-0.007324
8	0.9280	0.4488	0.1931	109.97	182.40	3.12	-0.007324
9	0.9281	0.4488	0.1889	113.24	187.97	3.09	-0.007324
10	0.9281	0.4488	0.1889	113.24	187.97	3.09	-0.007324
REFLUX	0.1947	120.00	0.2125				
FEED							
ERROR							
STEAM							
REBOILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
101.20	192.68	211.69	210.21				

TIME = 40.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	INITIAL
1	0.0004	0.4488	1.1819	17.13	158.02	14.17	-0.050318
2	0.3410	0.4488	0.2242	202.97	141.99	3.67	-0.034017
3	0.4488	0.4488	1.2102	220.47	147.97	1.58	-0.003445
4	0.2630	0.4488	0.2125	147.97	161.97	3.48	-0.003378
5	0.1083	0.4488	0.2012	89.42	170.31	3.32	-0.003378
6	0.0117	0.4488	0.2002	176.89	176.89	3.25	-0.002999
7	0.8187	0.4488	0.8433	104.72	182.13	3.18	-0.00133
8	0.9280	0.4488	0.1932	110.92	182.43	3.12	-0.002876
9	0.9281	0.4488	0.1889	113.24	187.97	3.09	-0.002876
10	0.9281	0.4488	0.1889	113.24	187.97	3.09	-0.002876
REFLUX	0.2699	120.00	0.2125				
FEED							
ERROR							
STEAM							
REBOILER							
TEMPERATURE							
COEFFICIENT							
HEAT LOAD							
101.20	192.79	211.80	210.21				

TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 50.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0907	0.4957	1.1819	78.87	128.09	14.77	0.007262
2	0.3419	0.6632	0.5547	206.94	142.04	3.67	0.016759
3	0.4596	0.7996	1.2134	220.88	157.17	3.58	0.012540
4	0.5637	0.8297	0.9118	235.99	161.68	3.48	0.009124
5	0.7092	0.8830	0.9028	90.50	170.41	3.35	0.011328
6	0.8119	0.9205	0.8558	99.22	177.03	3.24	0.011838
7	0.8794	0.9491	0.8930	105.82	182.25	3.17	0.008161
8	0.9284	0.9677	0.7926	111.04	185.49	3.12	0.005341
9	0.9593	0.9809	0.7878	114.27	187.60	3.09	0.003022
10	0.9809	0.0000	0.0000	116.38	0.00	2.83	0.001891

REFLUX	ERROR	FEED	FEED CONC.
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116.38	0.2215	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.75	211.77	5170.51	98318.24
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TIME = 55.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0914	0.4975	1.1819	78.95	128.22	14.77	0.009306
2	0.3434	0.6643	0.5528	207.15	142.15	3.67	0.018711
3	0.4607	0.8002	1.2177	221.07	157.26	3.58	0.012569
4	0.5644	0.8299	0.9111	236.17	161.73	3.48	0.007305
5	0.7100	0.8834	0.9044	90.63	170.50	3.34	0.008702
6	0.8128	0.9208	0.8547	99.39	177.12	3.24	0.009600
7	0.8800	0.9493	0.8928	106.00	182.33	3.17	0.006919
8	0.9288	0.9678	0.7919	111.20	185.56	3.12	0.004769
9	0.9595	0.9810	0.7858	114.43	187.65	3.09	0.002858
10	0.9810	0.0000	0.0000	116.51	0.00	2.83	0.002168

REFLUX	ERROR	FEED	FEED CONC.
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116.51	0.1284	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.66	211.68	5170.51	98320.18
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TABLE U-20 CLOSED LOOP - STEP 1 - 25.00

TIME = 20.0

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT-UP	DEVIATION
1	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
2	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
3	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
4	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
5	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
6	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
7	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
8	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
9	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
10	0.0000	0.4957	1.1819	1.1819	14.77	0.0000
REFLUX	0.5215	150.00	2.5150			
FEED						
FEED CONC.						
STEAM	TEMPERATURE					
REBOILER	STEAM					
101.20	192.75	211.77	210.21	192.75		

TIME = 22.00

PLATE	CONC	CONC EFFICI	LIQUID	VAPOR	HEAT-UP	DEVIATION
1	0.0014	0.4975	1.1819	1.1819	14.77	0.0000
2	0.0034	0.4975	1.1819	1.1819	14.77	0.0000
3	0.0060	0.4975	1.1819	1.1819	14.77	0.0000
4	0.0084	0.4975	1.1819	1.1819	14.77	0.0000
5	0.0100	0.4975	1.1819	1.1819	14.77	0.0000
6	0.0128	0.4975	1.1819	1.1819	14.77	0.0000
7	0.0180	0.4975	1.1819	1.1819	14.77	0.0000
8	0.0288	0.4975	1.1819	1.1819	14.77	0.0000
9	0.0527	0.4975	1.1819	1.1819	14.77	0.0000
10	0.0910	0.4975	1.1819	1.1819	14.77	0.0000
REFLUX	0.1584	150.00	0.2150			
FEED						
FEED CONC.						
STEAM	TEMPERATURE					
REBOILER	STEAM					
101.20	192.66	211.68	211.21	192.66		

TABLE U-20 CLOSED LOOP - STEP IN COMP. CONT. SET PNT.- RUN 2

TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
-------	-------	-------	--------	--------	-------	---------	------------

1	0.0921	0.4992	1.1819	78.86	128.34	14.77	0.007027
2	0.3448	0.6653	0.5512	207.18	142.25	3.67	0.013134
3	0.4616	0.8006	1.2212	221.09	157.33	3.57	0.008216
4	0.5649	0.8300	0.9106	236.16	161.76	3.48	0.003865
5	0.7106	0.8837	0.9053	90.59	170.56	3.34	0.004714
6	0.8134	0.9211	0.8540	99.38	177.17	3.24	0.005085
7	0.8805	0.9495	0.8925	105.98	182.38	3.17	0.003970
8	0.9292	0.9680	0.7914	111.19	185.60	3.12	0.002897
9	0.9597	0.9811	0.7842	114.40	187.67	3.09	0.001829
10	0.9810	0.0000	0.0000	116.48	0.00	2.83	0.001587

REFLUX	ERROR	FEED	FEED CONC.
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116.48	0.0445	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.57	211.59	5170.51	98322.03
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TIME = 65.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	HOLD-UP	DERIVATIVE
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1	0.0925	0.5002	1.1819	78.69	128.41	14.77	0.002966
2	0.3455	0.6660	0.5505	207.10	142.32	3.67	0.004689
3	0.4621	0.8008	1.2222	221.00	157.36	3.57	0.003406
4	0.5650	0.8300	0.9106	236.04	161.77	3.48	0.000337
5	0.7108	0.8837	0.9053	90.45	170.57	3.34	0.000407
6	0.8136	0.9211	0.8540	99.25	177.19	3.24	0.000815
7	0.8807	0.9496	0.8925	105.86	182.40	3.17	0.000909
8	0.9293	0.9680	0.7913	111.07	185.61	3.12	0.000804
9	0.9598	0.9811	0.7838	114.28	187.68	3.09	0.000604
10	0.9811	0.0000	0.0000	116.35	0.00	2.83	0.000860

REFLUX	ERROR	FEED	FEED CONC.
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116.35	-0.0094	150.00	0.5156
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STEAM FLCW	TEMPERATURE REBOILER	STEAM	COEFFICIENT	HEAT LOAD
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101.50	192.52	211.54	5170.51	98323.15
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TIME = 60.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	LIQUID	DERIVATIVE
1	0.0021	0.4332	1.1819	78.86	128.24	14.77	0.00024
2	0.3444	0.6627	1.1718	207.16	142.25	1.64	0.00134
3	0.4416	0.7022	1.2212	221.00	127.33	1.24	0.00116
4	0.4444	0.7022	0.9106	221.00	161.77	2.48	0.00116
5	0.4106	0.7022	0.9023	207.16	170.42	3.34	0.00116
6	0.4116	0.9211	0.8240	221.00	177.19	3.24	0.00089
7	0.8802	1.2492	0.8252	102.86	182.21	1.17	0.00321
8	0.9293	0.7022	0.7013	111.07	182.21	1.17	0.00289
9	0.9293	0.9811	0.7842	114.28	187.27	3.09	0.00183
10	0.9811	0.0000	0.0000	116.32	0.00	2.83	0.00183

REFLUX ERROR FEED FEED CONC.

116.48 0.0442 150.00 0.2126

STEAM TEMPERATURE
FLW REBOILER STEAM

101.20 192.22 211.24 2170.21 9832.03

TIME = 62.00

PLATE	CONCX	CONCV	EFFICI	LIQUID	VAPOR	LIQUID	DERIVATIVE
1	0.0021	0.4332	1.1819	78.86	128.24	14.77	0.00024
2	0.3444	0.6627	0.9202	207.16	142.25	1.64	0.00134
3	0.4416	0.7022	1.2222	221.00	127.33	1.24	0.00116
4	0.4444	0.8400	0.9106	221.00	161.77	2.48	0.00116
5	0.4106	0.8837	0.9123	207.16	170.42	3.34	0.00116
6	0.4116	0.9211	0.8240	221.00	177.19	3.24	0.00089
7	0.8802	0.9496	0.8252	102.86	182.21	1.17	0.00321
8	0.9293	0.7022	0.7013	111.07	182.21	1.17	0.00289
9	0.9293	0.9811	0.7838	114.28	187.27	3.09	0.00183
10	0.9811	0.0000	0.0000	116.32	0.00	2.83	0.00183

REFLUX ERROR FEED FEED CONC.

116.32 -0.0022 150.00 0.2126

STEAM TEMPERATURE
FLW REBOILER STEAM

101.20 192.22 211.24 2170.21 9832.03

A P P E N D I X V I I

CLOSED LOOP EXPERIMENTAL TRANSIENT RESPONSE DATA
FOR THE REFLUX FLOW RATES

A sample of the program used to calculate the reflux flow rates from chart percent data is presented.

The experimental results used to plot Figures 52, 53, and 54 are presented in Tables VII-1, VII-2, and VII-3, respectively.

SOURCE STATEMENT

\$IBFTC REFLUX NODECK

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C**  PROGRAM CALCULATES THE REFLUX FLOW AS A FUNCTION OF TIME
      REAL PC(100), TIM(100), LT(100)
      BRD=ALOC(200./71.)/ALOG(72./10.)
      ARD=200./(72.**BRD)
      WRITE(6,6) ARD,BRD
6     FORMAT (1X,2F13.8)
      READ(5,1) NDAT
      DO 4 N=1,NDAT
      READ(5,1) NT,SPG
      READ(5,5) (TIM(J),J=1,NT)
      WRITE(6,5) (TIM(J),J=1,NT)
      READ(5,5) (PC(J),J=1,NT)
      WRITE(6,5) (PC(J),J=1,NT)
      DO 2 M=1,NT
      LT(M)=SQRT(SPG)*ARD*(PC(M)**BRD)
      WRITE(3,5) TIM(M),LT(M)
2     WRITE(6,5) TIM(M),LT(M)
4     WRITE(3,7)
7     FORMAT (6H END )
1     FORMAT (1X,15,2F9.3)
5     FORMAT (1X,10F7.2)
      CALL EXIT
      END
```


Table VII-1

Experimental Transient Response of the
Reflux Flow Rate to Steps
In Feed Flow Rate

Run #1		Run #2	
Time (mins.)	Reflux Flow Rate lbm/hr.	Time (mins.)	Reflux Flow Rate lbm/hr.
0.0	136.68	0.0	146.37
2.0	136.68	2.0	146.37
4.0	136.68	4.0	146.37
6.0	137.01	6.0	145.59
8.0	138.34	8.0	144.49
10.0	139.98	10.0	143.21
12.0	141.60	12.0	141.60
14.0	143.53	14.0	139.98
16.0	145.59	16.0	139.16
18.0	147.15	18.0	137.51
20.0	148.43	20.0	136.68
		22.0	135.84
24.0	150.00	24.0	135.84
26.0	150.24	26.0	135.00
28.0	149.94	28.0	135.84
30.0	149.48	30.0	136.01
32.0	147.62	32.0	136.34
34.0	146.37	34.0	136.68
36.0	145.59	36.0	136.68
38.0	144.80	38.0	136.85
40.0	144.01	40.0	137.01
44.0	144.01	45.0	137.01
48.0	146.06	50.0	136.68
52.0	147.93	55.0	136.68
56.0	147.62	60.0	136.68
60.0	146.37	65.0	136.68
64.0	145.90	70.0	136.68
68.0	145.59		
72.0	146.06		
76.0	146.06		
80.0	145.43		
84.0	145.59		
88.0	146.37		
92.0	146.37		

Table VII-2

Experimental Transient Response of the
Reflux Flow Rate to Steps
in Steam Flow Rate

Run #1		Run #2	
Time (mins.)	Reflux Flow Rate lbm/hr.	Time (mins.)	Reflux Flow Rate lbm/hr.
0.0	116.09	0.0	128.10
2.0	116.8	2.0	128.10
4.0	118.01	4.0	126.32
6.0	118.96	6.0	124.51
8.0	119.90	8.0	122.69
10.0	120.84	10.0	121.21
12.0	121.76	12.0	120.46
14.0	122.3	14.0	118.96
16.0	122.69	16.0	118.01
18.0	123.05	18.0	117.05
20.0	123.60	20.0	117.05
22.0	124.20	25.0	116.09
24.0	124.51	30.0	116.09
26.0	124.88	40.0	116.09
28.0	125.6	50.0	116.09
30.0	125.8	60.0	116.09
34.0	126.00	70.0	116.09
38.0	126.4	80.0	116.09
42.0	126.8	90.0	116.09
46.0	127.21		
50.0	126.67		
54.0	127.20		
58.0	124.88		
62.0	127.21		
66.0	126.80		
70.0	127.28		
80.0	126.8		
90.0	127.21		

Table VII-3
Experimental Transient Response of the
Reflux Flow Rate to Steps
in Composition Controller Set Point

Run #1		Run #2	
Time (mins.)	Reflux Flow Rate lbm/hr.	Time (mins.)	Reflux Flow Rate lbm/hr.
0.0	102.83	0.0	109.13
1.0	123.60	1.0	135.00
2.0	117.44	2.0	131.59
4.0	144.14	4.0	125.96
6.0	112.16	6.0	121.76
8.0	111.16	8.0	120.84
10.0	110.15	10.0	119.90
12.0	108.11	12.0	119.34
14.0	106.03	14.0	118.96
16.0	106.03	16.0	118.58
18.0	106.03	18.0	118.96
20.0	106.03	20.0	118.58
25.0	107.07	25.0	118.01
30.0	107.28	30.0	117.44
35.0	107.69	35.0	117.05
40.0	108.11	40.0	116.86
50.0	109.13	50.0	116.48
60.0	109.13	60.0	116.09
70.0	109.13	70.0	116.09
80.0	109.13	80.0	116.09
90.0	109.13	90.0	116.09

A P P E N D I X V I I I
TEST DATA FOR THE VOLUME OF LIQUID ON
THE TRAYS AND IN THE CONDENSER REFLUX SYSTEM

Test data for determination of the volume of solution on the trays and in the condenser reflux system are presented.

A) Tray Volume

Total solution added to reboiler	=	0.706
Solution in reboiler at end of run	=	0.124
Solution on trays and in condenser	=	0.582
Solution in condenser	=	0.060
Volume of liquid on trays	=	0.522
Volume of liquid per tray	=	0.0653
All the above values are in cubic feet		

B) Condenser and Reflux System Volume

Volume of solution in glass part of condenser	=	0.0320
Volume of solution associated with reflux piping (1/2 inch copper tubing) of length 249 inches		
$V = \frac{\pi D^2 L}{4} = \left(\frac{\pi}{4}\right) \left(\frac{1}{4}\right) \left(\frac{1}{144}\right) 249 = 0.0282$		
Volume of solution in glass part of condenser	=	0.0320
Total	=	0.0602

All the above values are in cubic feet.

APPENDIX IX
MATERIAL BALANCE CALCULATIONS

A sample calculation of the closure that can be expected on the material and component balances is presented. The case selected is the step in feed flow rate from 122 to 101.5 lbm/hr.

INITIAL

	% Chart	Calibration	Corrected	Compositions	Component Flow
Feed			122.0	0.5151	62.8
Product	37.5	71.0	63.6	0.9705	61.7
Bottoms	22.0	62.3	61.8	0.0491	3.04
Balance			125.4		64.7
% Error			2.8		3.0

FINAL

Feed			101.5	0.5151	52.4
Product	30.0	63.5	57.1	0.9509	54.2
Bottoms	12.0	46.5	46.5	0.0061	0.28
Balance			103.6		54.5
% Error			2.1		4.0

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